Coal Age

APRIL, 1957

A McGRAW-HILL PUBLICATION—PRICE 50 CENTS

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Continuous Mining Methods . . . . . p 70

Improving Local Maintenance . . . . . p 76

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B.F.Goodrich report:

Photo courtesy North American Coal Corp., Cleveland, Ohio

Hose swallows needle-sharp slivers of coal

B. F. Goodrich improvements in rubber brought extra savings

Problem: At this mine, coal is put through a huge washing machine that shakes rock and sand out of the coal, much like a home washer shakes dirt out of clothes.

The water—8000 gallons of it a minute—used to be circulated in and out of the coal washer by steel pipes. But the water is loaded with tiny particles of coal—hard and sharp, like needles—that wore holes right through the steel. Welders worked every weekend, patching holes. The pipe was being replaced every year.

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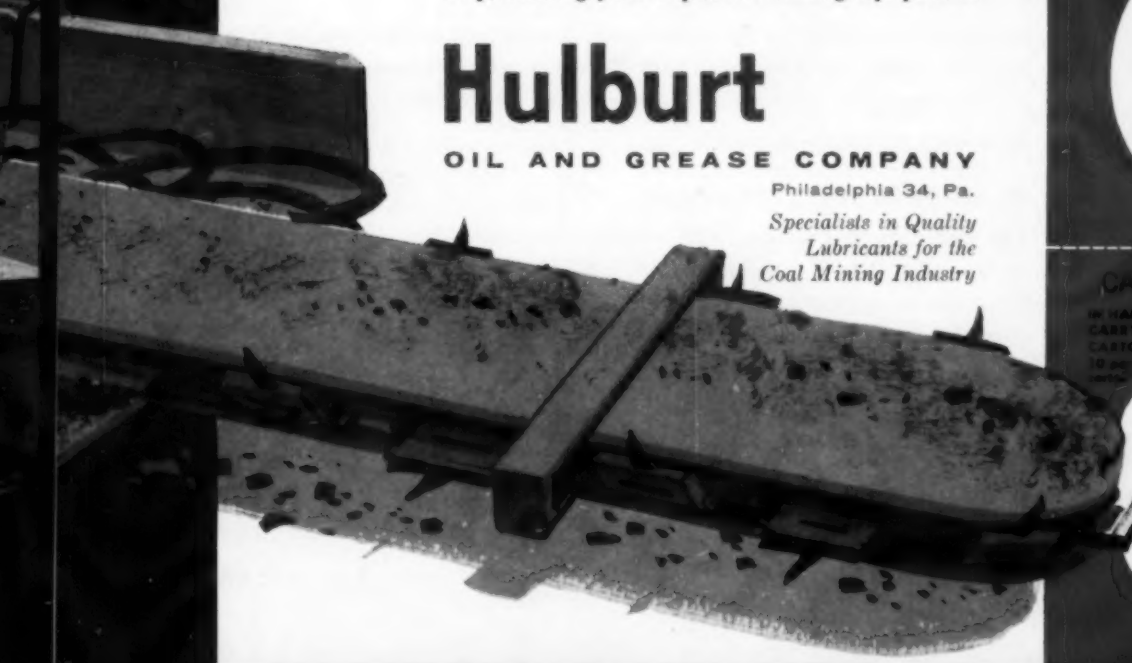

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This Month in Coal Age

APRIL, 1957

► Modern Merchandising

Anthracite for Space Heating .....p 54

W. A. Raleigh Jr., Assistant Editor, *Coal Age*

Money-saving, labor-saving and cleanliness features of automatic burning equipment have opened a new growth market for anthracite in commercial or large space heating—schools, hospitals, apartment houses, government buildings, etc. With more aggressive selling and expanded industry promotion, growth might average 400,000 to 600,000 tons annually during the next 5 yr. This added tonnage—based on the use of rice in automatic equipment—could (1) compensate for possible losses to home-heating customers, or (2) increase the total space heating market in 5 yr by 2 to 3 million tons if hand-fired tonnage can be kept in the fold.

Special Features: Needs and sales policy for space heating pictorialized; comparisons of anthracite and oil fuel and equipment costs; diagram of pneumatic coal and ash handling system.

► Thin-Seam Mining

How Peabody Mines 26-in Seam in Kentucky .....p 60

Bridge conveyors and mobile units carry the production load at Nos. 31 and 32 mines. Average output with bridge units is between 21 and 22 tons per face man and peak performance is better than 40 tons per man. Mobile units average between 17 and 19 tons per face man.

Bridge conveyors are used primarily for room work. Rooms are worked in pairs off both sides of three-heading room panels. It takes five days to drive two rooms 40 ft wide to a depth of 300 ft.

Mobile units advance entries on two-shift basis. Mains are developed with six headings on 50-ft centers. Belt conveyors carry coal from face area while top is brushed outby for track.

Sidelights—Three-wheel electrically powered utility cars ease supply handling; special chassis for mobile compressor reduces damage by providing more clearance; 13½-in-high rope belt adds 5 in clearance.

► The Biggest Mines

Top 50 in the Industry .....p 65

► Stripping

Stripping Without Shooting .....p 66

McNutt Coal Co. takes 60 to 80 ft of cover without shooting to recover 42 in of coal. Thin-bedded shales make such operation possible. Equipment includes three bulldozers, a 9-yd dragline and a 2½-yd shovel. The bulldozers and shovel cut down the upper part of the burden and push it into the old pit, moving an average of 30 ft and sometimes going up to 40. Final removal of the remaining burden is handled by the dragline. A second shovel, in addition to loading, removes bony and straightens the highwall to as nearly vertical as possible to facilitate making the next cut.

► Personnel Relations

How You Can Keep Key Men .....p 69

E. W. Fair, Boulder, Colo.

Ten ways to keep key men in your organization without undue emphasis on salary. Job conditions and job challenges, pride in the company and management interest are factors.

► Continuous Mining

Case Studies in Continuous Mining ..p 70

James T. Jones, Assistant Superintendent, Mather Collieries, Mather, Pa.

How mines in western Pennsylvania use the Lee-Norse miner, including mining plans presently in use and projected methods for the future. Minimum average raw-coal output per shift was 155 tons with 3.5 men. The average was 190 tons with 4.2 men, and the maximum average 240 tons with 6 men. Average bit cost ranged from 4 to 12c per ton, averaging 8c; parts cost, 11 to 25c, averaging 11c; and maintenance labor, 9 to 13c, averaging 11c.

Sidelights—Six diagrams of mining methods and projections for developing and recovering blocks, also plans for mining old areas developed for other types of equipment.

(Continued on p 7)

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MINING MAN'S GUIDE to Ryerson Products and Services

You can draw on your nearby Ryerson plant for an almost endless number of products and services—and the more you concentrate your purchases at one source, the more you save. Ryerson products not pictured here include: Re-bars, expanded metal, grating, plastic pipe, machinery and tools, etc. See your Ryerson catalog for complete list and write for descriptive literature.

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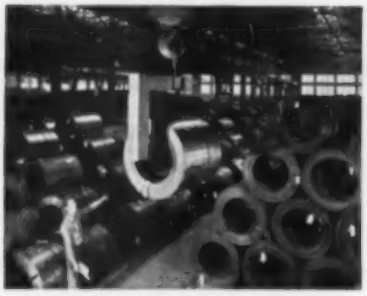
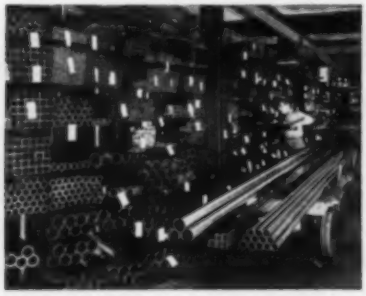


SHEETS & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



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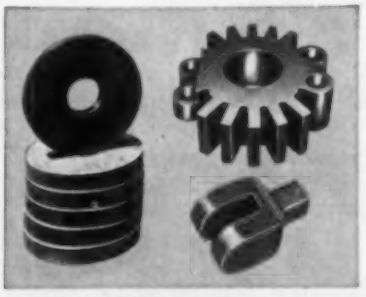

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► Roof-Bolting

Increasing Bolting Efficiency With Truck-Mounted Drills . . . . . p 74

Revised roof-bolting machine consists of two drills mounted on a machine truck for major increase in bolting efficiency. Cable handling and manual movement of drills from place to place are eliminated. Two heads halve number of drill settings, and the new design facilitates keeping roof-bolts and tools close at hand. An increase of approximately 60 to 70 tons per shift for each section has been attained.

► Maintenance Training

Improving Local Maintenance Through In-Company Training . . p 76

New training school for mechanics and electricians at Warwick mine, Duquesne Light Co., is an outgrowth of management's recognition of its responsibility to provide adequate tools and give proper training to the men who must perform maintenance functions in today's highly-mechanized coal mines. As a result, three classes of six mechanics each receive 6 hr per wk of intensive maintenance instruction on company time.

Hints You Can Use—How to equip a classroom for maintenance training; how to conduct practical exercises in troubleshooting.

► Mining Motors

Synchronous Motors: Application, Starting Operation . . . . . p 79

L. H. Harrison, Mining Engineer—Electrical, U. S. Bureau of Mines, Washington, D. C.

Synchronous motors in coal generally limited to m-g sets, fans, compressors and pumps, but they can be applied to practically every constant-speed drive. A major added advantage is corrective capacity for low power factor. Synchronous motors should never be operated underexcited since this aggravates the power-factor problem. Poor starting characteristics compared to the induction motor require care in starting, and excitation voltage should be stable.

► Strip Communication

How Two-Way Radio Promotes Strip Coordination . . . . . p 82

Mac and Don Chutz, Chutz Bros. Coal Co., Slippery Rock, Pa.

Communications problem involved in maintaining efficiency in operating nine pits producing 35,000 tons per month solved by two-way radio. Cost is estimated at $1.50 per day per unit, easily more than saved in

This Month in Coal

NEW MARKET FRONTIERS—Prices—both of coal and its competitors—assumed more than their ordinary importance as coal moved into the second quarter of 1955.

On the one hand was the problem of getting back the extra cost of the wage increase that became effective April 1. On the other was the increased marketing opportunities afforded by the rise in prices of competitive fuels, particularly oil.

Two new coal frontiers popped up both in Oregon, where Pacific Power & Light was prospecting the Eden Ridge coal field, and in Florida, where Tampa Electric and Florida Light & Power met with southern producers and railroads to explore the possibility of a coal supply for Florida.

Watch for more breaks on the oil front—and on the gas front too.

NO BUSINESS LETUP—While new marketing frontiers were opening up, coal also was looking forward to an end to the low production rate growing out of cold, floods and stockpile drawdowns in the first quarter.

The firming up of the production rate, in fact, showed up in March. Assurance of continued high level of production is provided by the forecasts of a high level of business activity now and for some months to come. There are minuses but, as McGraw-Hill economists point out, they are well outweighed by the plusses.

Cheering news for coal producers, who always fare better when things are good.

PROGRESS ON A PROBLEM—A major increase in the number of training programs for supervisors and miners in recent months is evidence that good times do not automatically eliminate the industry's problems.

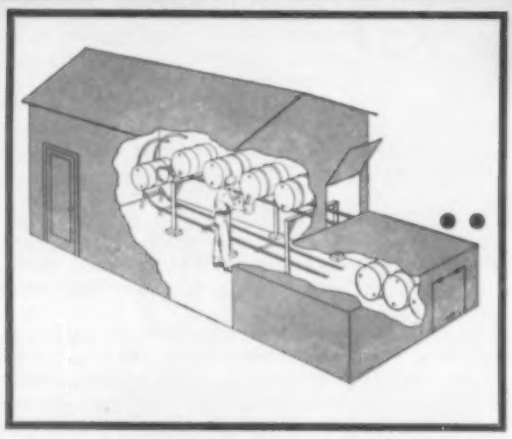
In part, these reflect a change in the nature of the industry, which also is responsible for a major change in the responsibilities and position of supervisors, and in a steady rise in the number of mechanics, electricians and shop men. This change in industry nature also has brought a new type of man into the picture in growing numbers—the industrial engineer.

Electricians, mechanics and shop men are in particularly short supply. Training is one way of increasing the number. Training programs, not only for these men, but for other workers and supervisors are destined for a major growth in number and scope.

NEW ROUND—Ohio strippers have been the targets of some of the sharpest and longest-sustained attacks ever mounted in any region. Now, another newspaperman is making a career of trying to regulate and restrict stripping out of the picture in Ohio.

Though the Ohio campaign is perhaps the one being the hardest pressed at the present time, it is not the only one. Pennsylvania—both bituminous and anthracite—and West Virginia also are the scenes of more-than-usual activity, and there is sporadic activity elsewhere.

Conclusion? Coal cannot afford to let down even momentarily in its job of keeping the public informed.



This type of oil storage house simplifies the handling problem. Filled drums are moved directly from the loading platform to the light gage mine rails above; empty drums are rolled onto lower rails and stored under the loading platform. Storage house should be of fireproof construction and kept clean at all times.

. . . starting point

Lubrication is an important item in your mine's operating budget. That's why you should give oils and greases the same special storage and handling care you give renewal parts.

A central storage house of the type shown here can help you prevent waste and contamination . . . protect lubricants from water, dust, dirt and other foreign matter. Moreover, it simplifies handling because it eliminates the need for expensive hoisting equipment and lifting from one level to another.

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LUBRICANTS for the Coal Mining Industry

Repeat Orders Follow Fine Performance of Bucyrus-Erie Rotary Blast Hole Drill

Early in 1955 the Central Ohio Coal Co. put a Bucyrus-Erie 50-R rotary blast hole drill into operation at its mine near Zanesville. The output of this drill was watched carefully, and a decision was soon reached: footage records called for conversion to 50-Rs at an early date. Accordingly, three more of these Bucyrus-Eries were subsequently added.

In pit after pit the story is the same — those who buy Bucyrus-Erie rotaries soon want to switch over exclusively to these moneymakers. Among the reasons for this preference are the following:

★ *Maximum controlled penetration* through hydraulically powered down pressure on the bit.

★ *Most efficient drilling speed* for a given formation because of Ward Leonard electric control on rotation of the drill stem.

★ *Continuous drilling of hole* for the full length of the drill pipe — 32 ft. 9 in. on the 50-R; 27 ft. 9 in. on the 40-R.

★ *Elimination of manual effort* when adding or removing drill pipe, made possible by remote-controlled, power-driven drill pipe rack.

★ *Air cooling of the bit* by compressed air.

★ *Efficient removal of cuttings* — fine cuttings are picked up and handled by a Roto-Clone precipitator; heavies pile up adjacent to the drill hole for use as stemming material.

Bucyrus-Erie rotaries are available in two sizes — the 40-R (equipped with either diesel-electric or full electric power) for drilling 6¾- to 9-in. holes, and the 50-R (electric only) for drilling 9⅞- to 12¼-in. holes. For detailed, illustrated literature, write today.

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This Month in Coal Age

CONTINUED

reduced auto mileage. Another major advantage is less loss of time following equipment breakdowns. Receivers operate only when a call is being made, relieving men of the need for listening constantly.

► Coal Movement

Pipeline Coal Transportation .....p 84

By C. A. Dauber, The Cleveland Electric Illuminating Co., Cleveland, Ohio

The 108-mi Georgetown-Eastlake coal pipeline represents a new method of reducing coal transportation cost. Costing $10 million, plus $2½ million for the drying plant, line will deliver over a million tons a year as a 50% coal 50% water slurry by weight. Size of the line is 10¾ in O.D. Travel time is 30 hr at 4½ fps. A substantial saving is expected compared to the present $3.30 rail rate.

► The Bolting Picture

Roof-Bolting in 1956 .....p 88

E. M. Thomas, Mining Engineer, Roof Control, U. S. Bureau of Mines, College Park, Md.

In 1956, 35% of bituminous coal was mined under bolted roof, 264,000,000 bolts were used per month.

The Coal Commentator .....p 12

Major unsolved problems in coal mining, the growing importance of industrial sales to anthracite, one new suggestion for cutting federal expenditures and taxes, new haulage ideas for today and tomorrow, J. F. Joy's contributions to mining progress.

Foremen Forum .....p 90

Management's responsibilities today, as seen by **Clifford Hood,** president, United States Steel Corp.

Operating Ideas .....p 96

Belt strips warn of restricted mine head room; nonskid crowbar easily made; diverting chute permits continuous car loading; air-placed concrete solves heading repair problem; clamp-on hook made from scrap.

Equipment News .....p 102

Over 30 products for all phases of mining from aluminum safety floor treads through overburden and prospecting drills to lubricants and theodolites, including radios, German mining units, and self-vulcanizing rubber-repair material.

News Roundup .....p 126

Florida utilities, southern producers and southern railroads study means of inaugurating coal movement to the deep south; West Coast utility prospects for coal in Oregon; Glen Alden diversification controversy ends up; British increase coal output with fewer men; Simpson Creek buys Cambria-Clearfield; other regular and special news features.

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The Coal Commentator

Have an Answer?

After you have made a track in snow, how can you get rid of it? This is not a facetious question. It is being asked of everybody by the National Inventors Council of the U. S. Department of Commerce because the military would love to have the answer to help protect men and equipment from air attack. It also would love to have eight other gadgets and systems.

If you have an answer, write to the NIC, USDC, Washington 25, D. C. But maybe you would like to tackle something a little closer to home, since the coal industry has some problems as tough in their way as any confronting the military. **How to look into rock is one. The answer would save a lot of lives. A remote mining system with an unlimited range and a low-cost method of reducing the impurity content of coal to zero are others.** In fact, every phase of mining, not to mention marketing public relations and so on, provides an opportunity for progress. The answers may not be easy to come by, but the rewards are really big.

Year by Year

With Buckwheat No. 1 allocated to the steam category, the anthracite output in 1956 was split almost 50-50 between domestic and steam sizes. With No. 1 allocated to the domestic category, the split is approximately 60-40. Part of the rice might also be considered domestic, still further increasing the ratio of domestic to steam.

Even with everything possible allocated to domestic, however, the 1956 anthracite results show a further growth in the percentage moving into industrial markets. Established or partially established industrial markets include power-plant fuel, pelletizing iron ore, sintering and certain other applications. Possibilities include admixture in the production of coke and the production of gas. At the same time, as pointed out in the lead feature in this issue, the space-heating market continues to offer a real opportunity.

Forecast? An anthracite comeback that will pick up more and more power year by year.

Even One

A depression that "would curl your hair" was forecast as a possibility earlier this year by no less an authority than Secretary of the Treasury Humphrey unless the pace of government spending is cut. More recently, Ex-President Hoover remarked that he thought he could detect signs that the process had begun. But more recently still, the McGraw-Hill Department of Economics, in its latest report on business, found no indication that the curling process is imminent.

But this does not alter the fact that government spending is not only high but is still headed upward. One result is a revival of a suggestion of some years ago that the government sell its hydro facilities to private owners. Some $20 billion would be available for debt reduction, annual interest charges would be cut about $600 million, and other major tax benefits would accrue. Maybe not all could be disposed of immediately, but the sale of even one plant would reverse a trend that not only keeps the tax rate up but concentrates more and more power over the individual in the hands of the government. Perhaps a little support for the idea might be a good thing.

Haulage Tomorrow

Wherever coal is produced the problems are much the same and the thinking of mining men is along similar lines. Thus, the United States, Great Britain and Germany, as examples, are presently concentrating on haulage and hoisting. **The United States, which already is pumping refuse to disposal points and coal from mine to market, is working on the idea of a mine pipe line from the face to the tipple, which would make it the first in the world to use a pump as a mainline haulage unit.**

A U. S. metal miner was the first to hoist solid material by pumping—an idea the British are converting into a first for them in coal. The British also are working on a modification of the bucket chain as a hoisting medium and report encouraging possibilities from the standpoints of flexibility, capacity and power requirements. In Germany, according to a report in a recent edition of the *German-American Trade News*, coal men are experimenting with pneumatic hoisting. The pilot installation is said to be raising 60 tph up to 1,000 ft vertically. Your commentator is seeking more details. **Meanwhile, it is apparent that the coal mines of the future will be moving coal much more efficiently—whether with better units of the conventional variety or with completely new types.**

J. F. Joy

The company of men whose ideas and activities have resulted in profound changes in the character of the coal industry is not a large one. It includes Joseph F. Joy, whose career in the development of mining equipment and methods came to an end at Ft. Pierce, Fla., Feb. 19. It began more than 40 years earlier, when Mr. Joy put his first experimental loading machine into the Somers mine of the Pittsburgh Coal Co. in 1916, following up with the first successful machine in the same mine in 1917. This machine was the foundation on which the present worldwide Joy organization was built.

The roll of other Joy developments is a long one. With the loader, they contributed to making the 20's, the 30's and the 40's an era difficult to match in terms of progress within a given space of time.

Saved by the belt: $750 to $1,000 a year

PREVIOUS BELTS were always problems: They stretched excessively. They spilled coal. Fasteners constantly pulled out. Breakdowns were frequent. And one belt failed completely in only a year and a half.

Then this Tennessee mine tried a Coal-Flo belt of super-tough rayon. It's muscled to stand up under rough, tough mine service—designed for excellent troughability.

Results were spectacular: Spillage was virtually eliminated. Repair needs shrank. In fact, this Goodyear belt has now been in service a near-record 9 years—looks as if it might last 9 years more. *And maintenance savings average $750 to $1,000 a year!*

Looking for a belt that can do as well in *your* operation? Just check with the G.T.M.—Goodyear Technical Man. You can reach him—*fast*—through your Goodyear Distributor. Or write: Goodyear, Industrial Products Division, Akron 16, Ohio.

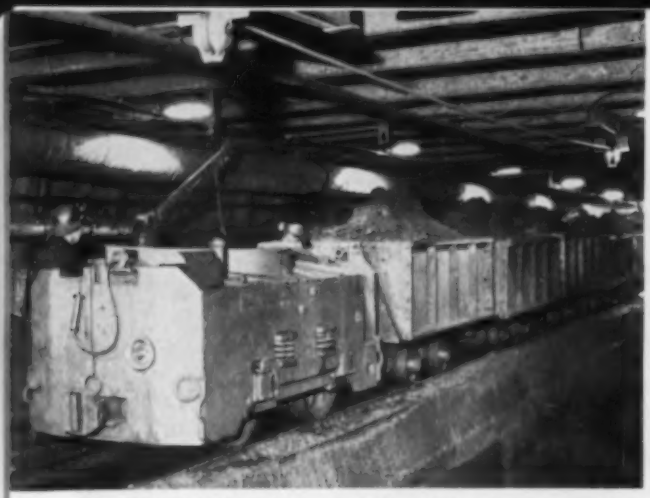
COAL-FLO BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*



1. TROLLEY-CABLE REEL—Built in 4-8 ton sizes, opened or sealed types, these versatile units can do gathering jobs quickly, economically. Centrally hung motors and equalized spring suspensions help prevent rail pounding, climbing.

2. TROLLEY—Fast, powerful, safer, and easy on the track, this heavy-duty haulage locomotive is available in eleven sizes, 4 to 40 tons, low height or standard. Requires little maintenance, is of sturdy, rugged construction.

3. STORAGE BATTERY—In sizes from 1½ to 10 tons, this type unit gives highly reliable, efficient, safer service for operations where trolley wires are not feasible. Battery eliminates stand-by losses, delays due to power failures.

4. DIESEL-ELECTRIC—G.E.'s powerful diesel-electrics are available in seven standard sizes, 25 to 80 tons . . . are ideal for surface haulage and switching operations. Electric drive gives them long life, dependability.

A General Electric locomotive matched to your needs gives you fast, efficient, low cost mine haulage

Whatever your mine haulage or gathering requirements, there's a General Electric locomotive that will suit your needs. Whether for underground or surface haulage, a G-E straight-electric or diesel-electric locomotive can haul your loads faster and at reduced costs.

General Electric offers a complete standard line of sturdy, dependable industrial and mine locomotives—available in a full range of sizes, heights, widths, and track gauges. Typical of these G-E locomotives are the four types shown above.

G-E locomotives have proven their efficiency in thousands of mine and industrial applications under extremes of moisture, temperature, dust, and track conditions. You can expect this same efficient, highly reliable performance from a G-E locomotive that is matched to your mine's requirements. High availability and low maintenance costs mean that G-E locomotives can do your haulage jobs better . . . faster . . . more economically.

FOR MORE INFORMATION about G-E industrial and mine locomotives, or for a survey of your particular haulage needs—without cost or obligation—contact your nearest G-E Apparatus Sales Office. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 120-94

Progress Is Our Most Important Product

GENERAL ELECTRIC

Every Bite is a Payload

The effective use of power equipment is the very essence of successful mining operations. And everywhere that power is used in mines, you'll find Simplex-TIREX cords and cables on the job. These expertly engineered cords and cables, newly improved for greater flexibility, feature cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water... gives longest life. **SIMPLEX WIRE & CABLE CO.,** 79 Sidney Street, Cambridge 39, Mass.

Wire sculpture by Henry Szafarz

Shovel Cable Type SH-D

LIVE BETTER ELECTRICALLY

Simplex

TIREX

See us at the Coal Show Booth 1607

A Southern Ohio stripper cut over-all mining costs 25 cents per ton by augering low-cost recovery coal with this McCarthy Coal Recovery Drill. The recovery coal itself cost $1.25 less per ton than the strip coal.

AUGERED and STRIP COAL COMBINED CUTS STRIPPER'S COST 25 cents per ton

Auger-mine low-cost recovery coal to lower your stripping costs—as much as 25 cents a ton!

One Southern Ohio strip mine operator saved this much with only one McCarthy Model 14-30-36 Coal Recovery Drill. Working one six-hour shift per day with only two operators, he augered approximately 10,000 tons per month of recovery coal. The cost per ton, including make-ready, operation, maintenance, depreciation and hauling, was only $2. By spreading this saving over his entire operation, he cut his delivered strip coal cost from $3.25 to $3 per ton. Strip coal output was about 40,000 tons per month.

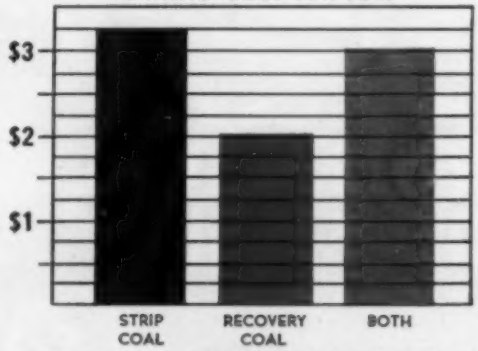
This is why more strippers each year add McCarthy Coal Recovery Drills to their list of production equipment. The McCarthy drill is a cost-saver and a money-maker. It's self-moving, all hydraulic, and requires only two operators. Contact the nearest Salem Tool representative for details. For immediate service, phone or write direct.

Visit our booth No. 2141 at the Coal Show.

Manufacturer of Drilling Equipment Since 1901

It Pays to Auger-Mine Low-Cost Recovery Coal

MINING COST PER TON*



*Based on 10,000 tons of augered coal and 40,000 tons of stripped coal per month.

THE SALEM TOOL CO.

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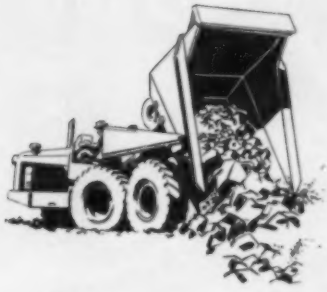
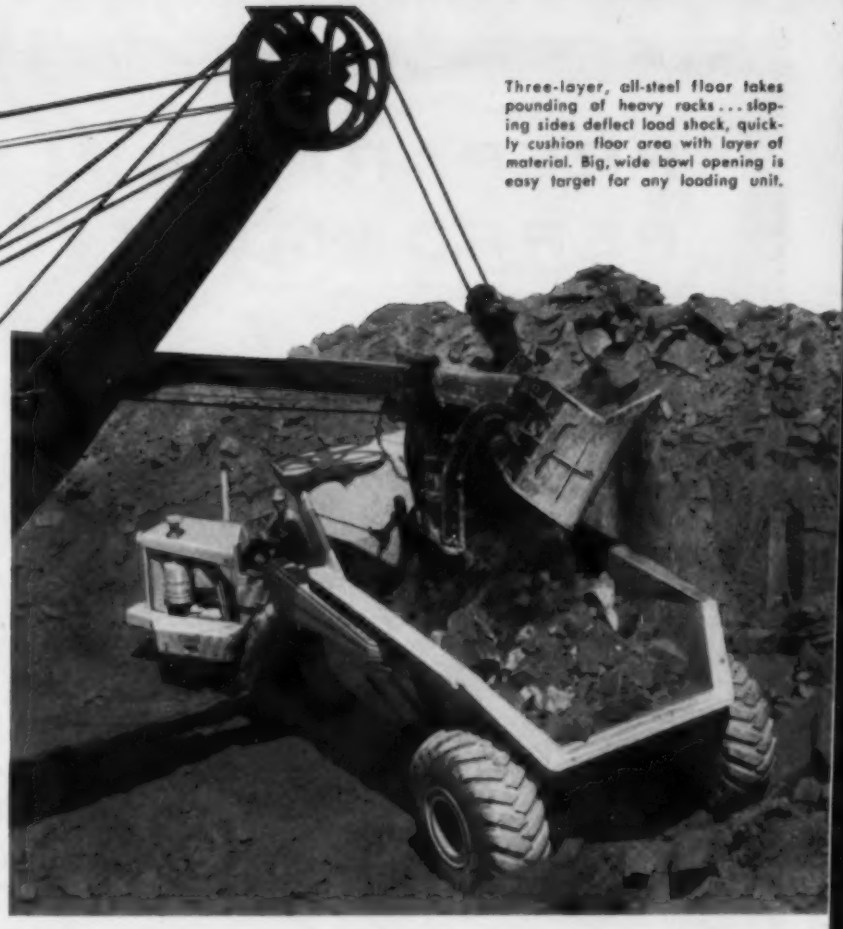
How to cut your hauling costs...





Three-layer, all-steel floor takes pounding of heavy rocks... sloping sides deflect load shock, quickly cushion floor area with layer of material. Big, wide bowl opening is easy target for any loading unit.

Your excavating and mining profits depend upon a *fast, continuous* hauling operation, all year long. Around the world, in all kinds of weather — modern LeTourneau-Westinghouse Rear-Dumps have been job-proven as high-production haulers. These high-speed units are extremely maneuverable. They haul anywhere, load and dump fast, cut weather delays, and insure future earnings. Here are the facts that back these important claims:

Hauls anywhere

With rubber-tired speeds, Tournapull® Rear-Dumps travel safely over paved highways, city streets, cross-country ... through muck, rock, and soft fill. Tournapull's ability to work through soft and slippery footing is due largely to these four L-W Rear-Dump features:

*1. **Power-transfer differential** ...* automatically transfers up to 4 times the power from slipping wheel to wheel on firmest footing.

*2. **Geared kingpin electric power steer** ...* permits operator to pivot prime-mover — up to 90° left or right — to "walk" drive wheels onto solid footing.

*3. **Big, single low-pressure tires** ...* provide traction and flotation ... stay on top of the ground, instead of digging in.

*4. **"Humping", by varying wheel base** ...* alternately pulls and pushes hauler out of ditch or mud hole. Operator sets front-wheel brakes and raises body with electric motor, pulling rear wheels forward. Then, with rear brakes set and front brakes released, bowl is lowered, pushing prime-mover wheels forward as wheel-base lengthens. Process is repeated, 'til drive wheels are on firm ground.

Easy loading

Large "target" (8'9" x 10'10" — on "C" Rear-Dump) permits easy loading without spillage. Rear of body provides wide, low entry for dipper — to give extra speed advantage for your shovel. By reducing cycle time, big-capacity Rear-Dumps make every load a profitable one!

Fast dumping

At touch of a dashboard switch, point-of-action electric motor instantly raises bowl to any desired angle. At full dump position, edge of bowl is behind and below rear wheels, so material cannot roll forward to lodge against wheels nor pile under rear end. Streamlined body sheds stickiest material readily.

Short 180° turns

"C" Rear-Dump makes continuous 180° turn in space only 28'8" wide. With body in dump position, unit can turn 180° in only 20'8"! This unusual maneuverability of L-W Rear-Dumps allows you to work in tight quarters where smaller conventional haulers often cannot go.

3 sizes; interchangeable work units

Tournapull Rear-Dumps are available in 3 sizes; 11, 22, and 35 tons. Behind basic prime-mover, other trail units — such as scraper, bottom-dump, lift-and-carry crane, logging-arch, and flat-bed hauler — can be interchanged. For just a small additional investment, they'll keep your Tournapull prime-mover profitably busy all year-around! Call or write for complete details.

R-1410-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

VISIT BOOTH #2118—AMERICAN MINING CONGRESS—CLEVELAND, MAY 13-16.

PREPARATION PERFORMANCE

preceded by

60

Successful Years . . .

A FAIRMONT -built Preparation Plant

is in a class all by itself

YOURS: All the modern developments plus all the exclusive advantages of FAIRMONT -engineering and FAIRMONT -construction

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

Tournatractor moves in between shovel-swings to clean up spillage and doze blasted stone for easier loading. Shovel cycle is not interrupted, because of rubber-tired tractor's sure-footed speed to 17 mph on uneven pit floor.

Tournatractor handles dozing quickly . . . gets good bladeful of rock, moves about 2½ cubic yards in 30-ft. dozing run. Versatile machine handles many other quarry assignments, pushes in blasted stone, cleans up around stockpiles, pulls other equipment around quarry.

Versatile Tournatractor dozes overburden between cleanup and other assignments. Shovel in background removes 6' to 10' of overburden. Tournatractor quickly cleans stone shelf so that production shovels can move in.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-997-Q-bw

Rubber-tired tractor works fast on watery pit floor

A large Ohio quarry, producing 700,000 tons of limestone yearly, uses one rubber-tired Tournatractor to handle all clean-up and pit maintenance. The tractor covers 325 acres . . . maintaining and building haul roads, moving freight cars, pushing in toe of stockpiles, bunching blasted stone, cleaning around shovel.

6" of water, no barrier

A few days before these pictures were taken, heavy rains left as much as 6 inches of water on the quarry floor. Rolling easily on its big 21:00 x 25 low-pressure tires, the tractor maneuvered in and out of the watery loading area, handled its assignments quickly and efficiently.

A major Tournatractor advantage when working in rain and water is that all moving parts in its power train are completely enclosed. They operate in a constant bath of oil, sealed against moisture. Lubricants stay in to prevent corrosion and maintain machine's high-operating efficiency and low-maintenance cost.

"Beats crawler on rock"

Foreman Bernard Boli said, "Tournatractor has crawler beat all to pieces on rock . . . gets around 1¼-mile quarry easily. Our biggest reason for buying the Tournatractor was speed." And operator Charles A. Slover said, "Tournatractor is a wonderful machine for the operator. It doesn't beat you around like a crawler. Besides lubricating quickly, and being able to move six 45-ton-load cars, I like the ease of riding."

Perhaps you can use a 210 hp rubber-tired tractor

To handle widely scattered dozing, pushing, and clean-up assignments, let Tournatractor help you speed operations, save you money. Let us show you owner-verified performance records of Tournatractor on work similar to yours.

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

SCANDURA

Gold Line for Coal Mining

Tough • Strong • Fire Resistant

"THE BEST OF THEM ALL"

Acceptance designation "Fire-Resistant, U.S.B.M. No. 28-1" has been assigned to this belt.

More and more mines are using and reordering SCANDURA because:

GOLD LINE is completely Fire-Resistant

GOLD LINE uses mildew inhibitors and rot proof Nylon to assure *double* mildew and moisture protection

GOLD LINE resists abrasion and cover stripping better than conventional belting

GOLD LINE easily absorbs shock loads and impacts

GOLD LINE has a tensile strength substantially higher than conventional five ply belts.

Exclusive Distributors for the Mining Industry East of the Mississippi

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SCANDINAVIA BELTING COMPANY,
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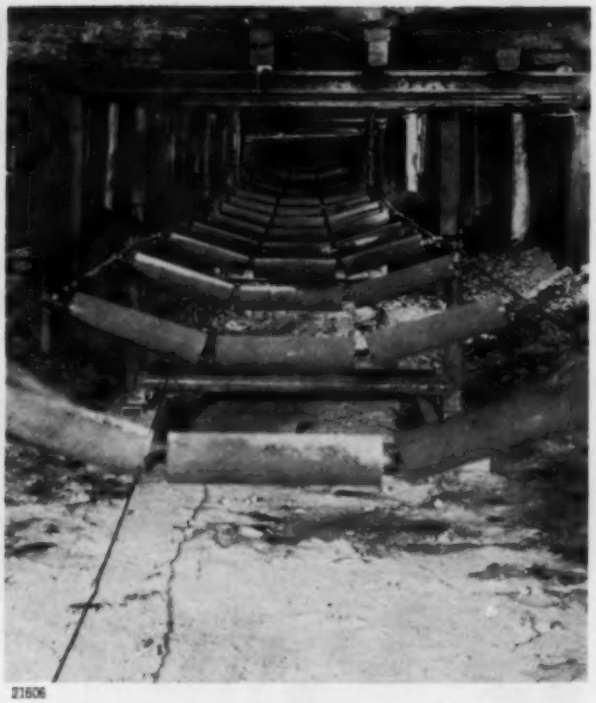


Patented and Patents Pending 21683 21606

This 4000 foot Goodman *Rope Belt** Conveyor was installed at a $65,000.00 saving

Not long ago a large midwestern mine installed 4000 feet of 48" Goodman Rope Belt Conveyor for main-line haulage. Accurate records were kept of material and installation costs. These were then compared with previously recorded costs for 4000 feet of 48" conventional type framed conveyor.

Here are the startling results:

- **Cost of terminal units for both installations was the same.**
- **Cost of intermediate sections of the Goodman Rope Belt Conveyor was almost 50% less than the conventional type.**
- **Cost of belting for the Rope Belt Conveyor was $21,000 less because a lighter ply belt could be used (resiliency of Rope Belt Conveyor absorbs load impact at carrying idlers).**
- **Installation cost of Rope Belt was only ⅓ that of conventional conveyor.**
- **Total savings, 22%, or approximately $65,000.00**
- **All materials for the Rope Belt installation were carried in 18 cars . . . 20 man-shifts saw all material spotted . . . and 40 man-shifts took care of complete installation. Contrast this with the 60 cars needed to haul material for the conventional framed conveyor . . . 62 man-shifts to spot it . . . and 120 man-shifts to install it.**
- **The 4000 feet of Rope Belt required less than one hour to train when originally started as compared with three days for initial training of 4000 feet of conventional conveyor.**
- **One man spends only 3½ hours clean-up time along 1500 feet of Rope Belt Conveyor while it required two men a full shift for the same distance along the conventional conveyor.**

This is just one example . . . and no doubt a very good one. Comparisons in other mines may show greater savings . . . or less. But the fact remains . . . a Goodman Rope Belt Conveyor has a lower initial cost . . . lower installation cost . . . lower maintenance cost . . . than conventional type framed conveyors.

These worthwhile savings, together with many operating advantages and economies have been proved over and over again where ever Rope Belt Conveyors have been installed. Let us give you the complete story. Write today. There's no obligation.

*Trademark

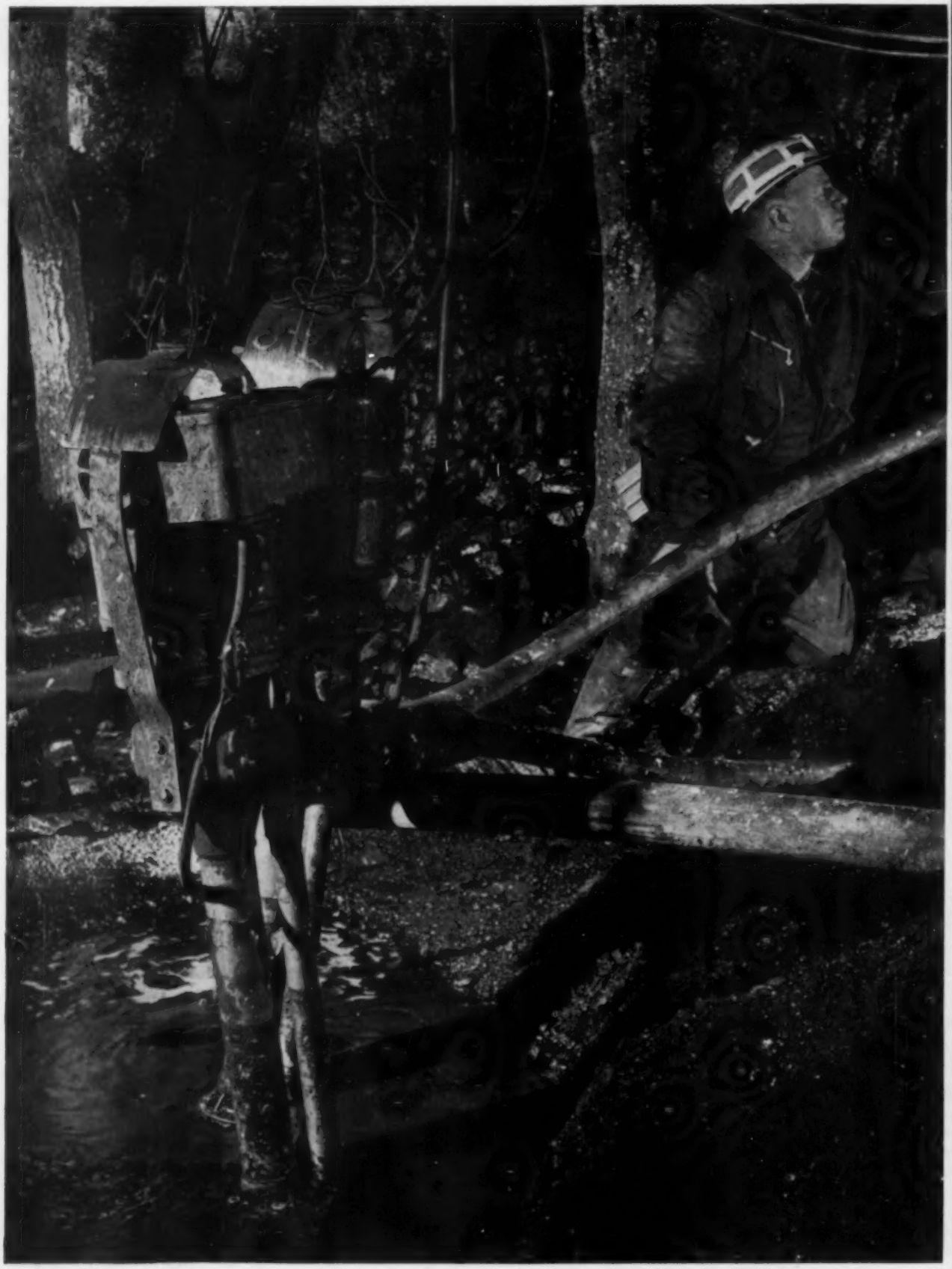
GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts



"Westinghouse-pump motors work 5,830 continuous hours with no breakdown"

At Jamison Coal & Coke Company's Mine No. 21

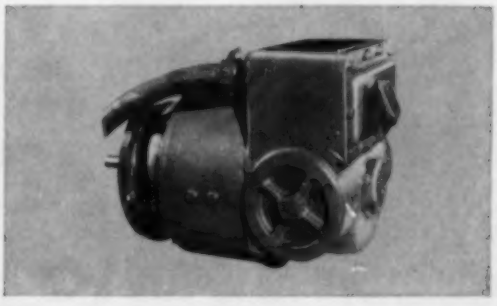
The work face of Jamison Mine No. 21 at Hostetter, Pa., would be flooded if it were not for dependable Barrett-Haentjens sump pumps. The motor-driven "Hazleton" portable pumps shown here have been discharging highly acidic mine water 24 hours a day, 7 days a week, for over eight months. Other Westinghouse-powered pumps at the mine have operated continuously for as long as two solid years.

Westinghouse is constantly working with leading mine equipment builders like Barrett, Haentjens & Company to provide the industry's most reliable electrical equipment. For example, a new ¾-hp, 550-volt, d-c explosion-proof motor will be in production soon to meet the growing trend toward higher voltage distribution systems in modern mines.

Get all the facts about Westinghouse mining motors, both standard and special, by calling your Westinghouse sales engineer today. Or, write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-22031

YOU CAN BE SURE... IF IT'S Westinghouse

Loading machines operating at the face in Jamison Coal & Coke Company's Mine No. 21. Westinghouse also builds explosion-proof motors for this application, and for all kinds of tough mining jobs.



This compact combination motor and control unit is ideally suited for use on portable and semiportable mine auxiliary equipment where small motor pumps, rock dusters, etc., are required.

WIRE ROPE AT WORK

This picture graphically illustrates the tremendous role of the dragline excavator in surface mining. The workhorse you see here, scooping up big bites of overburden, seems to be digging a canyon while at the same time creating a small mountain range. It is owned by J. Robert Bazley Inc., a stripping contractor well known for his work in the coal fields of Eastern Pennsylvania.

Wire rope plays a particularly important part in the operation of a dragline machine. In this case, the owner made sure of long rope life by rigging with Bethlehem lines throughout. Ropes of three sizes were involved: 1⅞-in. diam for the drag, 1⅜ for the hoist, 1¼ for the boom. All were Purple Strand Form-Set, Bethlehem's top-grade preformed; and all had independent wire-rope core to protect against crushing.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • QUARRYING • CONSTRUCTION • EXCAVATING • PETROLEUM • LOGGING • MANUFACTURING

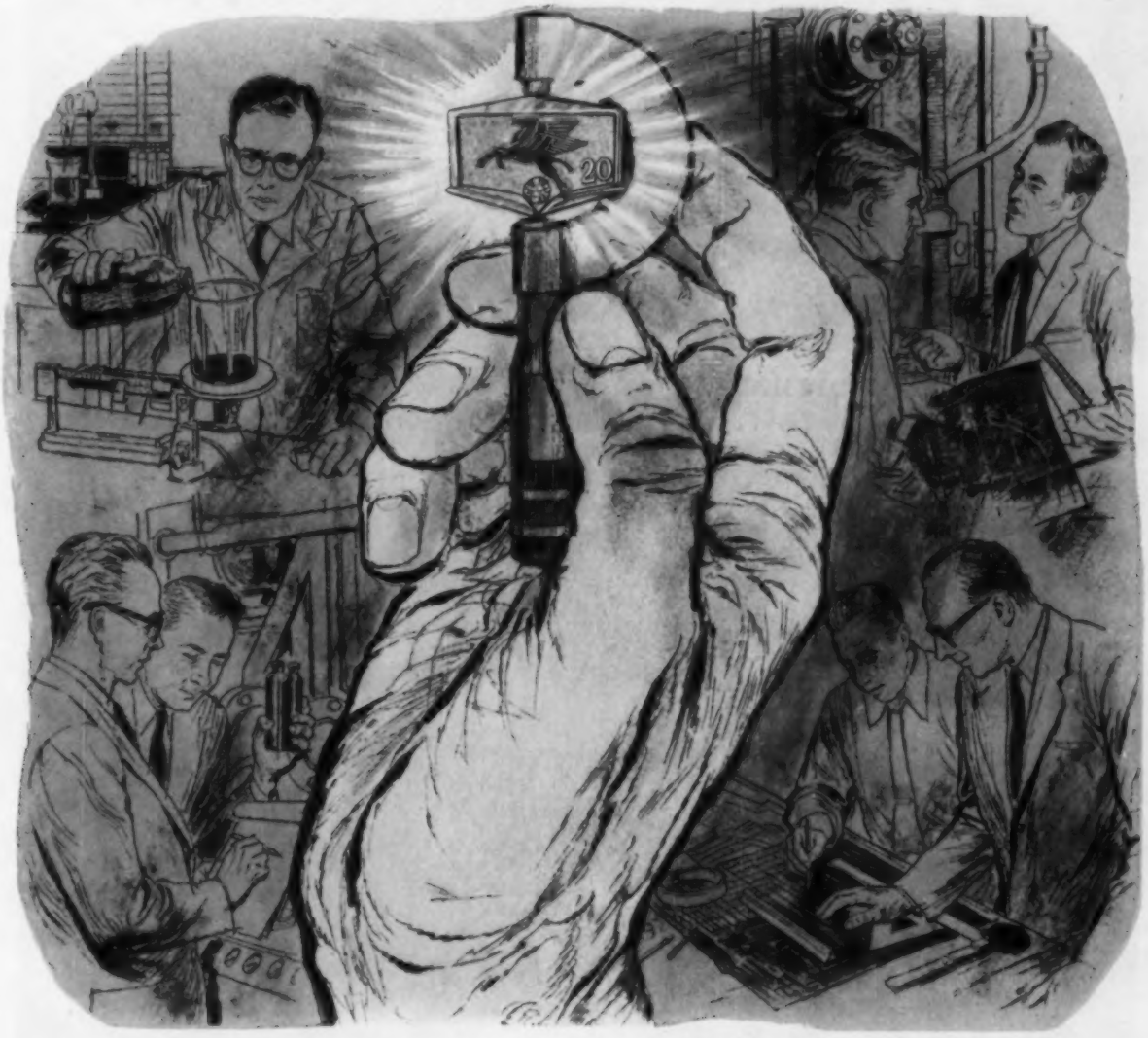
MEASURE OF A MAN

Technically, this jeweled lapel pin measures a mere 0.370 inches. But, in terms of what it represents it is the measure of a man—his depth and breadth of experience, his ability to help you.

The man is your Socony Mobil representative. The pin represents twenty years of service. Almost half of our lubrication engineers and salesmen wear it. In fact, the average length of service of *all* Socony Mobil representatives is over 17 years.

This great background of practical experience, coupled with the most comprehensive lubrication program ever offered by any petroleum company, is yours when you depend on Mobil products.

This combination has resulted in improved production, reduced maintenance costs for thousands of industrial plants. Why not yours?

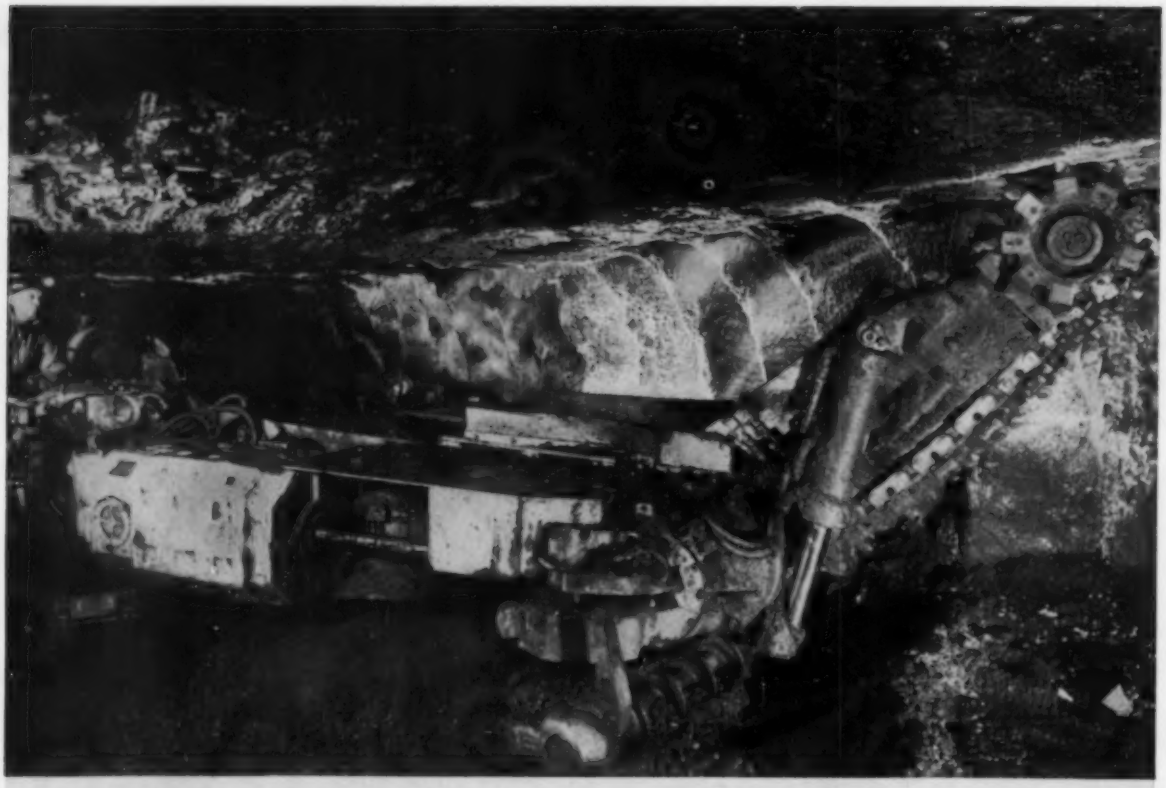


Leader in lubrication for 91 years

SOCONY MOBIL Mobil *Correct Lubrication*

A proved program to reduce maintenance costs

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

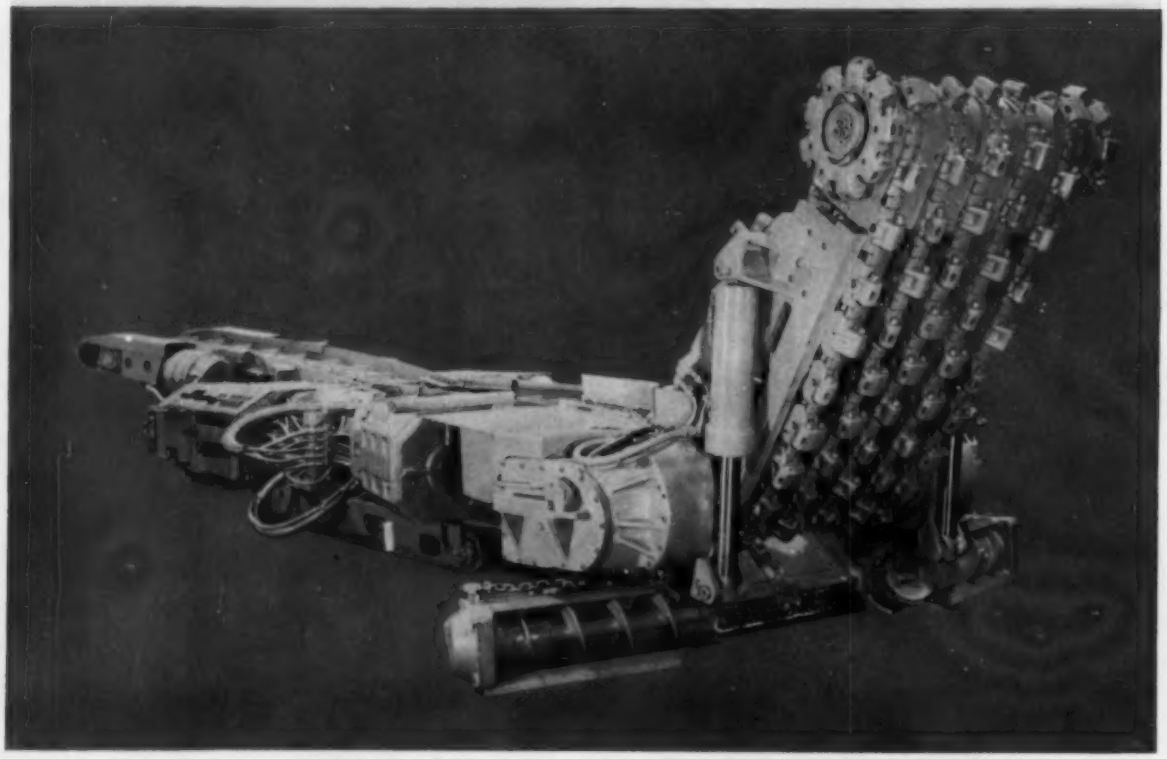


REACHES UP TO 82" FROM FLOOR

The 5-CM gets its long reach from a long 5' ripper head and a deep (24") sumping stroke. Two 100 horsepower motors take care of this heavy work load.

EXTRA-WIDE RIPPER HEAD

A full 42 inches across delivers more coal per cut—fewer cuts per complete face cycle. New direct-acting hydraulic shear jacks and swing jacks supply the "punch."

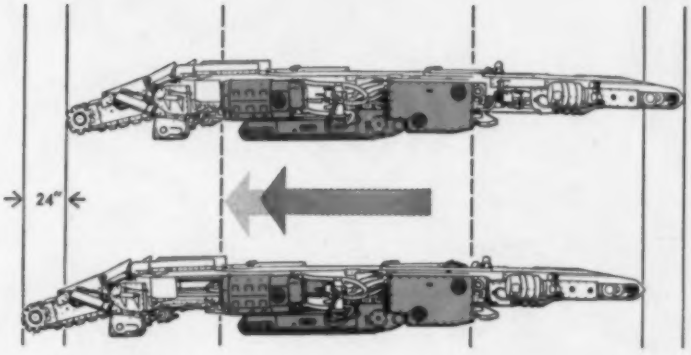


NEW JOY LOW MINER

DELIVERS 4 TO 5 TONS PER MINUTE

JOY 5-CM MINES SEAMS AS LOW AS 38"

Now, even more mines can get the full advantages of continuous mining with the introduction of Joy's new 5-CM. This low (32") Continuous Miner works up to 82" from the floor. It's a close cousin to earlier, time proved Joy miners . . . yet has many new advances that permit a low height machine to deliver such high tonnage.



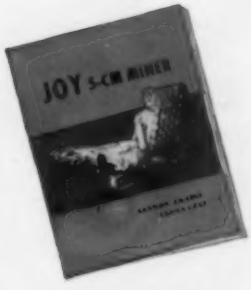
24 INCH SUMP

With every sumping operation the 5-CM enters a full 24 inches into the face . . . delivers extra tons for every operating cycle of the ripper bar as it sweeps across the working face.

CONTINUOUS CONVEYOR

The drawings at left show how the entire ripping and conveying systems of the miner move forward as one unit during sumping. There is no hopper—just one extra-wide (29½") chain conveyor that moves coal swiftly away from the face.

There's lots more—increased power . . . hydraulic tramming—improved clean-up conveyors. Get complete details on this new miner designed to mine 4 to 5 tpm in medium-low seams 38-inches and higher. Write ***Joy Manufacturing Company. Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



WRITE FOR FREE BULLETIN 169-1

and

See it at the Coal Show in Lakeside Hall

JOY EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY

CONTINUOUS MINERS

LOADERS

DRILLS

CUTTERS

WBW CL6580-169

Time is Money - SAVE IT

with the Lee-Norse BUS & JITNEY

Take a real good look at these LEE-NORSE "TIME-SAVERS"! Like modern misers they hoard minutes into extra productive hours by cutting portal to portal time—reducing costs—increasing tonnage output.

Lee-Norse MINE PORTAL BUS

(Locomotive Type)

This self-propelled Portal Bus for hauling section production crews to and from the face is unique with its split roof construction giving the driver an unimpeded, all directional view . . . the trolley is always within easy reach of the operator. Our standard low and high type Portal Bus operates in the majority of coal mines and will haul from 13 to 20 Men. This Portal Bus is powered with one (1) large motor (15 H. P.) and has two (2) independent braking systems for complete safety — (airplane-type) disc brakes hydraulically operated on each axle and dual mechanical hand operated service brakes on each wheel.

TIME IS MONEY — SAVE IT with the Lee-Norse Mine Portal Bus!

Lee-Norse JITNEY

Wherever they're in use—they're regarded as a time saving asset. Fleet and versatile the Jitney furnishes quick, sure transportation to and from the working face for key personnel, inspectors, engineers, etc. When required the Jitney can be pressed into service as an ambulance and is suitable for pulling fire fighting equipment.

TIME IS MONEY — SAVE IT with the Lee-Norse Jitney.

Write NOW for Literature

Lee-Norse Company

CHARLEROI, PA.

DESIGNERS AND BUILDERS OF THE FAMOUS LEE-NORSE MINER

ALEMITE Announces

the all-new SURGEPRUF LINES OF REUSABLE COUPLINGS AND RUBBER HOSE

NO SKIVING!

...Available Now Nationwide!

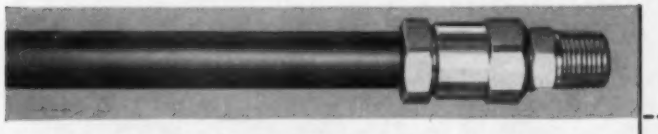
Now, for the first time, Alemite brings you a completely new line of *reusable, non-skive* couplings and hydraulic rubber hose—exclusively designed for faster, more economical replacements . . . to cut maintenance costs, downtime and inventories!

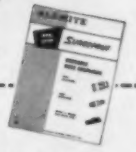
Rugged Alemite Surgepruf Couplings meet practically any original equipment or field replacement need. Hose are available for either medium-high or high-pressure service, with single or double wire braid. Couplings are made of high-strength steel . . . and J.I.C. thread design assures positive, long-lasting seal.

Contact your nearest Alemite Distributor for full details. Standardize—*save money*—on the complete new line of superior Alemite Surgepruf equipment!

Only Alemite Surgepruf Couplings Offer All These Advantages for Faster On-the-spot Replacements and Repairs!

- NO HOSE-SKIVING REQUIRED! "Double-wedge" grip forces coupling threads through rubber cover . . . grips either single or double wire braid solidly. Saves both time and labor!
- GIVES TIGHTER GRIP! Double-wedging action gives tighter grip as insert is drawn farther into coupling.
- NO SPECIAL ASSEMBLY TOOLS REQUIRED! Fast, easy assembly with just ordinary tools!
- TYPES AND SIZES FOR ALL HYDRAULIC LINES.





New Alemite Surgepruf Couplings and Hose Have Been Factory-tested and Field-proved!

ALEMITE
REG. U. S. PAT. OFF.

STEWART SW WARNER

Division of STEWART-WARNER CORPORATION

WRITE FOR FREE CATALOG

Alemite, Dept. N-47
1850 Diversey Parkway, Chicago 14, Illinois

Please send me my free copy of the complete Surgepruf Catalog.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

Dump in *one second* with Dumptor®

On the above operation, Koehring Dumptor drives up to the hopper, body forward. Operator trips the body-release lever, and *gravity* tilts the 6-yard body 70 degrees. One second later the load is out, and Dumptor is on its way back for the next load. Because there is no waiting for slow-acting body hoists, *gravity-dumping* saves 15 to 25 seconds on every round trip. This adds up to a substantial increase in extra yards per hour. For instance — take a typical 1,000-foot haul, where you normally would make 16 trips an hour. By saving an average of 20 seconds dump-time on each trip, Dumptor gains 320 seconds, or 5.3 minutes more productive haul-time an hour. You get 17½ trips, instead of 16. This, alone, adds 9% to hourly production. What's more, there are no expensive hoist-replacement parts, or hoist maintenance time. *Gravity-dump* never wears out, never balks. You get the same one-second dumping *every time,* under heaviest loads, in all temperature extremes. Better check what this can mean in lower costs, and increased production on your hauling operations. Get the complete Dumptor story from your local Koehring distributor. *Call him today.*

Plenty of power on the haul — You get better than 6 h.p. for every ton of loaded weight when you haul with heavy-duty Dumptor. That's why it accelerates fast, pulls through soft ground, up ramps and grades with less shifting — climbs 24% grades fully loaded. When hauling heavy materials, extra horsepower means extra load-carrying capacity.

No-turn shuttle hauling — Dumptor solves problems of operating in tunnels, along overhead trestles, or narrow haul roads. There is no need to turn, because it travels with equal ease, power and speed in either direction. No-turn hauling offers a big production advantage, too. Every turn saved cuts 15 seconds off cycle time, increases output.

Easy-loading target — Big, 64 square-foot body opening permits loading Dumptor over the side or either end. This saves spotting time, reduces spillage. Heavy duty body is built for rock. Top edge and bottom are box-beam constructed. Sides and ends are rib-reinforced. In fact, Dumptor has a ton of strength for every ton of payload capacity.

Time-saver on stockpiling — Dumptor puts stockpiling on a fast shuttle-haul basis — eliminates turning on top of pile. Notice how instant dumping action kicks the load out over edge of pile — saves a lot of dozer clean-up. Free-swinging kick-out pan breaks load suction in wet, sticky materials, bolts down to floor when handling rock.

KOEHRING COMPANY, Milwaukee 16, Wis.

Subsidiaries: PARSONS · KWIK-MIX · JOHNSON · KOEHRING-WATEROUS LTD.

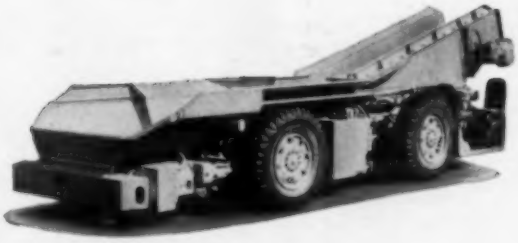
KOEHRING HEAVY DUTY

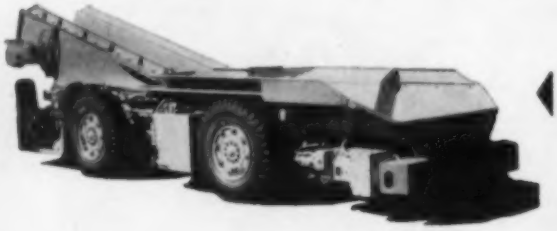
More round trips per shift and bigger payloads with **JEFFREY SHUTTLE CARS**

Class 68 Shuttle Car—heights from 24 to 32 inches; capacities from 2.4 to 3.9 tons; average speed 3.2 MPH fully loaded, 3.5 MPH empty. Though having a low basic height, it embodies all features of design and operation found in higher cars.

Class 66 Shuttle Car—heights from 30 to 48 inches; capacities from 2.7 to 6.1 tons; average speed 4 MPH fully loaded, 5 MPH empty. 66A in basic heights of 30" or 36" with maximum of 42" using sideboards. 66B in basic heights of 36" or 42" with maximum of 48".

Class 67 Shuttle Car—heights from 44 to 60 inches; capacities from 4.6 to 9.2 tons; 88" or 96" wide; average speed 4.2 MPH fully loaded, 4.9 MPH empty. 67A in basic height of 44" with maximum of 55" with sideboards. 67B in basic heights of 48" or 54" with maximum of 60".





Class 90 Shuttle Car—low cost, heavy duty . . carries up to 8 tons. Trams at an average of more than 4 MPH. Unloads in less than a minute. 44" and 50" basic heights with 4", 6" or 8" sideboards.

Four-wheel drive with no-slip differential between wheels on the same axle . . . four-wheel steering . . . four-wheel disc type hydraulic brakes . . . full magnetic, progressive series-parallel acceleration with hand-selection series position; all add up to account for the high degree of maneuverability offered by Jeffrey shuttle cars.

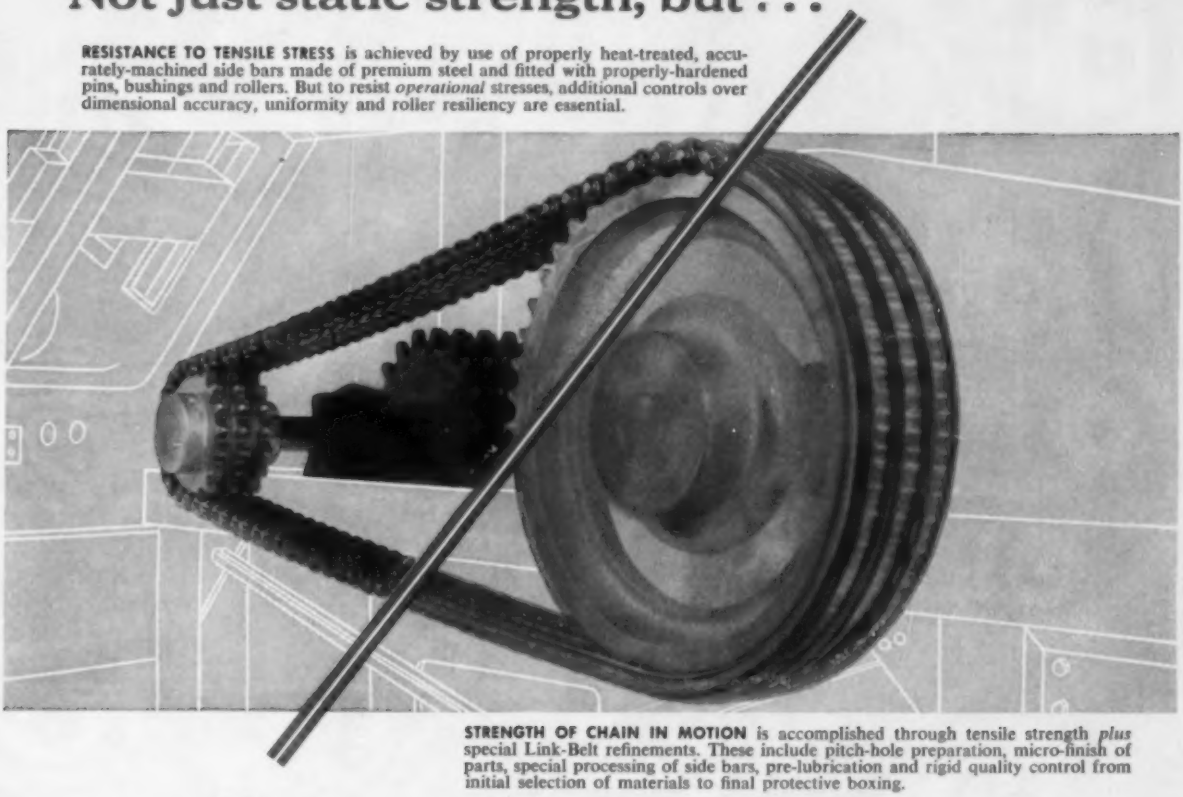
Loading and unloading are fast, because the operator has the aid of the variable speed, hydraulically driven discharge conveyor. It can be reversed instantly to clear jammed lumps. Jeffrey shuttle car payloads can be matched to your mining height.

JEFFREY

THE JEFFREY MANUFACTURING COMPANY
912 North Fourth Street • Columbus 16, Ohio

Not just static strength, but . . .

RESISTANCE TO TENSILE STRESS is achieved by use of properly heat-treated, accurately-machined side bars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist *operational* stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.



STRENGTH OF CHAIN IN MOTION is accomplished through tensile strength *plus* special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of side bars, pre-lubrication and rigid quality control from initial selection of materials to final protective boxing.

dynamic strength

assures longer work-life for LINK-BELT Roller Chain

In addition to known tensile loads, roller chain in motion is frequently subject to other operating stresses. Engagement with sprockets . . . shock of starting loads . . . centrifugal loads—there are many similar stresses.

Link-Belt's solution: greater dynamic strength, achieved through design, manufacturing and processing "extras" . . . plus a combination of other important refinements. And you see the results in smoother, more efficient performance that lasts measurably beyond the life of ordinary roller chain—cuts your drive and conveying costs.

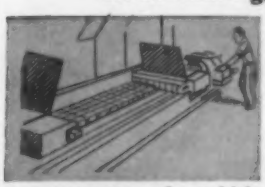
Near you is a Link-Belt office or authorized stock-carrying distributor where you can get full information on the complete Link-Belt range of single and multiple widths, ¼ to 3-inch standard pitch, and 1 to 3-inch double pitch. Ask for your copy of 148-page Data Book 2457.

LINK-BELT

ROLLER CHAIN & SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 15); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,121

LINK-BELT gives you dynamic strength that comes from these important EXTRAS

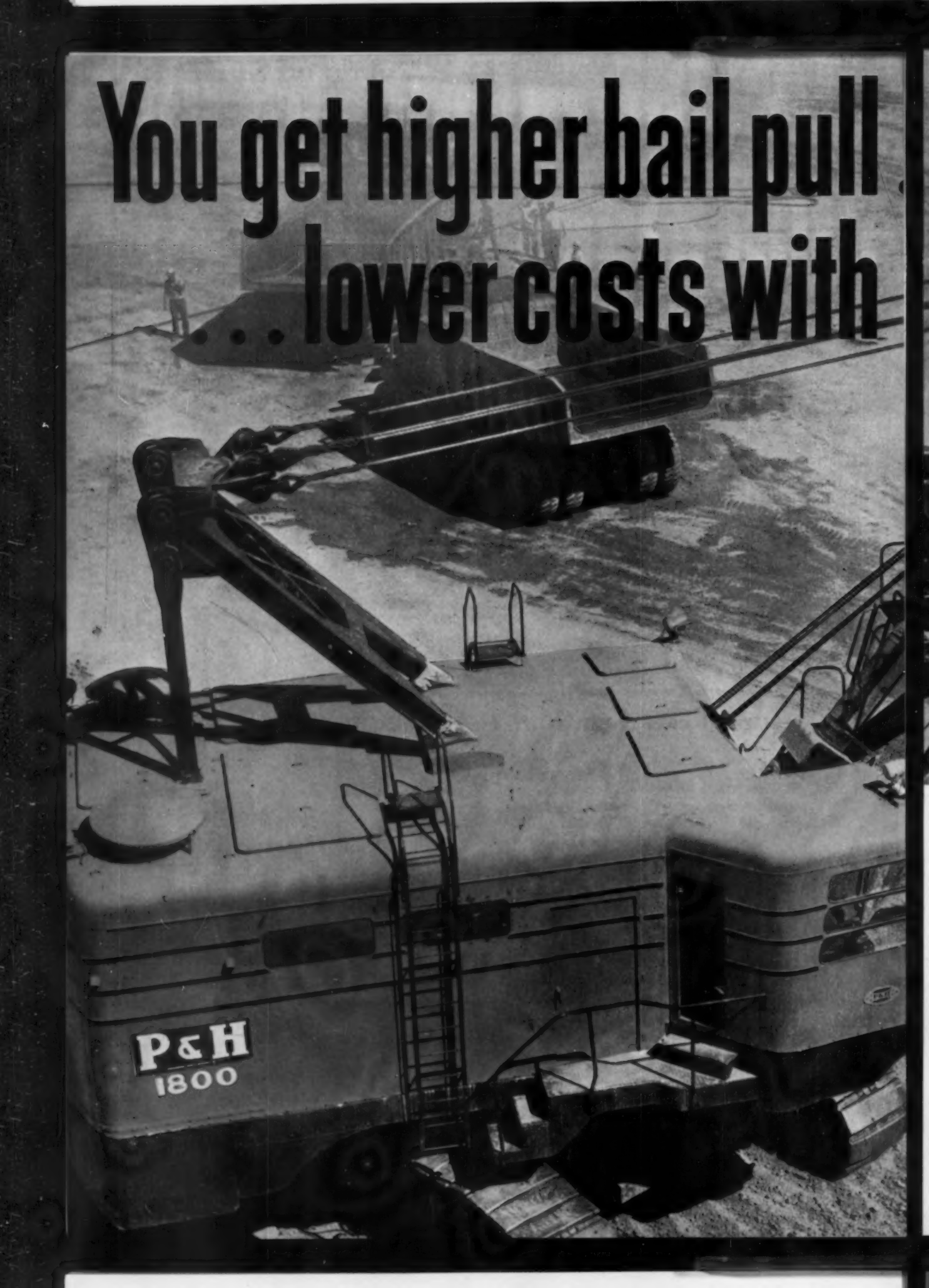


PRE-STRESSING of multiple width chain provides uniform load distribution.

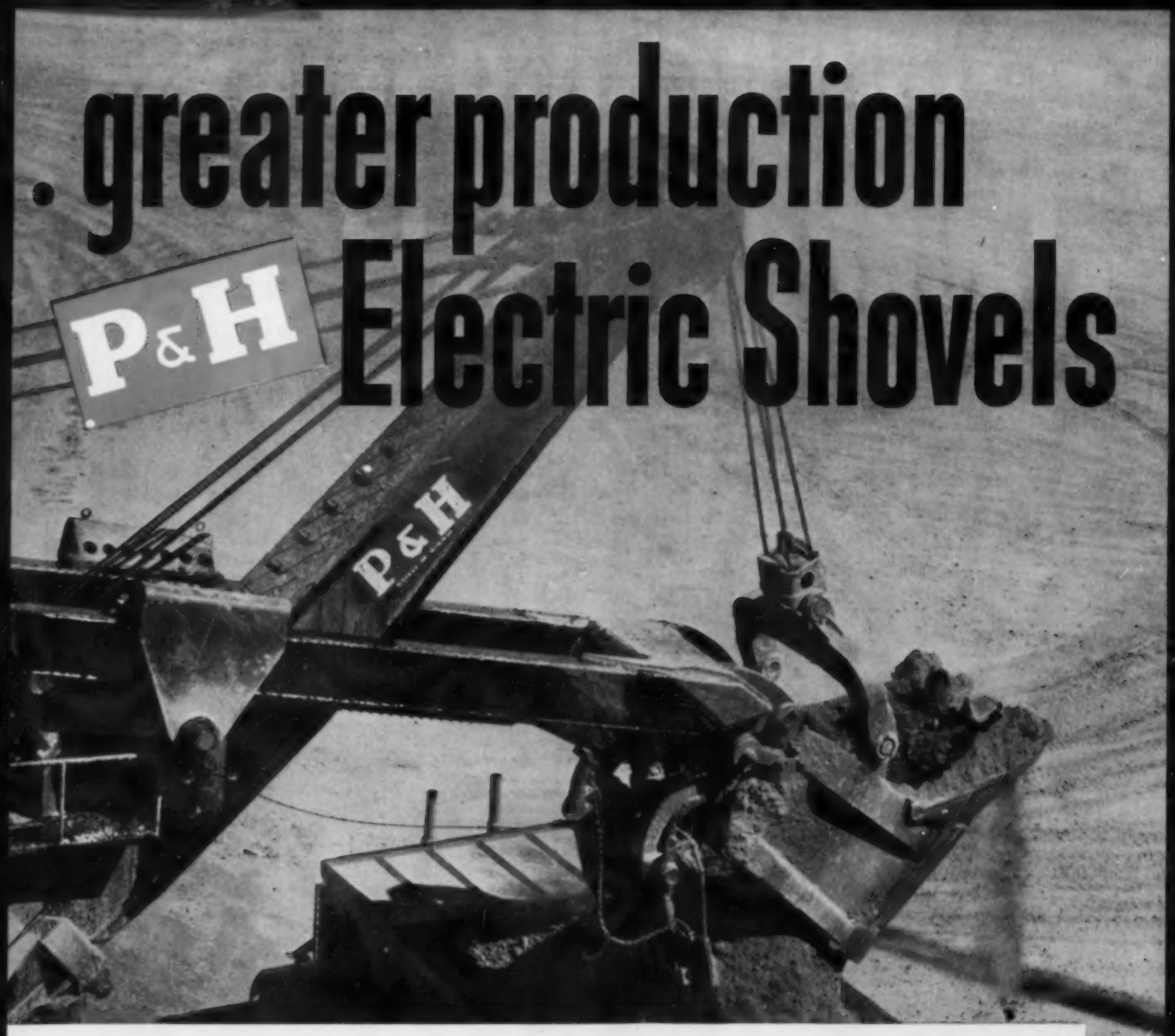
SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL —coupled with rigid testing insures uniformity.

LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.


You get higher bail pull
. . . lower costs with
P&H
1800

. greater production P&H Electric Shovels



P&H scientific weight distribution gives greater stability permitting the use of higher line pull per cu. yd. of dipper capacity—resulting in greater production at lower cost.

For P&H has set the design standards for the electric shovel industry with these *exclusive features:* Magnetorque* and P&H Electronic Controls.

MAGNETORQUE . . . transmits power from the hoist motor to the dipper magnetically for faster action, and at the same time, eliminates shock and impact to the hoist gear train and motor. Response is immediate to varying load conditions.

ELECTRONIC CONTROLS . . . P&H designed and built to provide fastest action of any type of control available on electric shovels. All motions are smoother, resulting in consistently higher output.

Magnetorque and P&H Electronic Controls mean reduced maintenance and greater availability.

With P&H you get single source responsibility. Another distinct advantage experienced only by users of P&H Electric Shovels. P&H designs, manufactures and applies all electric rotating equipment specifically for electric shovel service.

*T. M. of Harnischfeger Corp. for electro-magnetic type coupling.

P&H ELECTRIC SHOVEL LINE:
3½ through 8 cu. yd. capacities.

HARNISCHFEGER

CONSTRUCTION & MINING DIVISION
Milwaukee 46, Wisconsin

At Bradford Hills Quarry, Downingtown, Pa., equipment of Lukens "T-1" steel of 321 min. Brinell hardness now handles 1000 tons of limestone daily—so far has lasted more than 18 times as long as metals previously used for the same purpose.

Lukens "T-1" Steel outlasts previous metals 18 to 1

TRADEMARK *

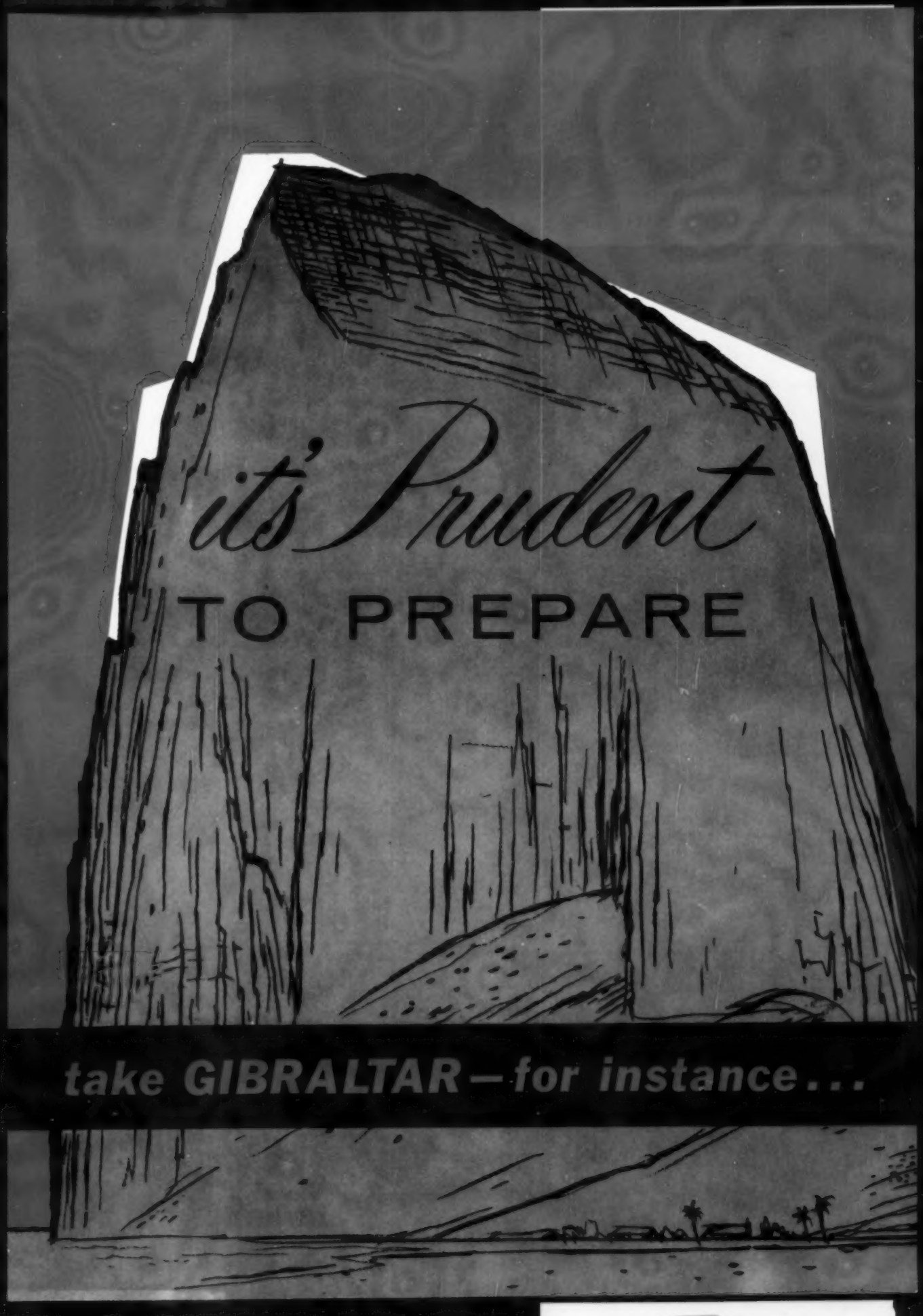
Maintenance and replacement costs dropped sharply in chute liners, impact crusher caps, and similar parts when Bradford Hills Quarry switched to Lukens "T-1" steel. These critical parts once wore out in a month. Now they show little or no wear *after 18 months.*

Whether you handle stone, coal, or metal ores, Lukens "T-1" steel in areas hardest hit by punishing impact and abrasion will save you money too. Wear plates, dredge pump liners, storage bins, and fly-ash collectors are just a few typical applications.

Lukens "T-1" steel retains its remarkable combination of hardness and toughness at temperatures well below zero. *Look into it now. Write for informative illustrated booklet, "Lukens 'T-1' Steel." Address Manager, Marketing Service, Room 902, Lukens Steel Company, Coatesville, Pennsylvania.*

LUKENS ®

Helping industry choose steels that fit the job


it's Prudent
TO PREPARE
take GIBRALTAR—for instance...

Yes. Take, for example, the Gibraltar Coal Corporation's new plant at Central City, Kentucky. Here is a coal preparation installation that *can take it*. It is engineered for profits. It has operating flexibility, speed, and economy—typical of what McNally Pittsburg know-how can do for you.

Two McNally Norton Washers are the heart of the installation. They beat steadily away pumping a continuous flow of washed fuel at 850 tph—over 2,000,000 tons per year. So well planned is the rest of the facility that its pace need never be slackened for lack of supply or lack of storage space for the washed fuel.

Ask the Men Who Kn

The raw coal storage piles provide a steady flow of blended raw coal. Piles are maintained by the raw coal dump which has flexible speeds up to 900 tons per hour to accommodate the continuous pit run.

Variations in barge traffic can't slow down the washer, either, because of the low-cost washed coal storage facility and the unique McNally Pittsburg barge loader that can operate at speeds up to 850 tons per hour to fill as many as twelve barges. A McNally Pittsburg automatic sampler is used to continuously check the quality of the delivered fuel.

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Preparation Is Our Business

Mail Post Card for Information

1. Complete plants
2. Equipment
3. Parts

FIRST CLASS PERMIT No. 93 (Sec. 34.9, P. L. & R.) PITTSBURG, KANS.

BUSINESS REPLY CARD
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McNally Pittsburg Mfg. Corp.

PITTSBURG, KANSAS

Ask the Men Who Know C

The raw coal storage piles provide a steady flow of blended raw coal. Piles are maintained by the raw coal dump which has flexible speeds up to 900 tons per hour to accommodate the continuous pit run.

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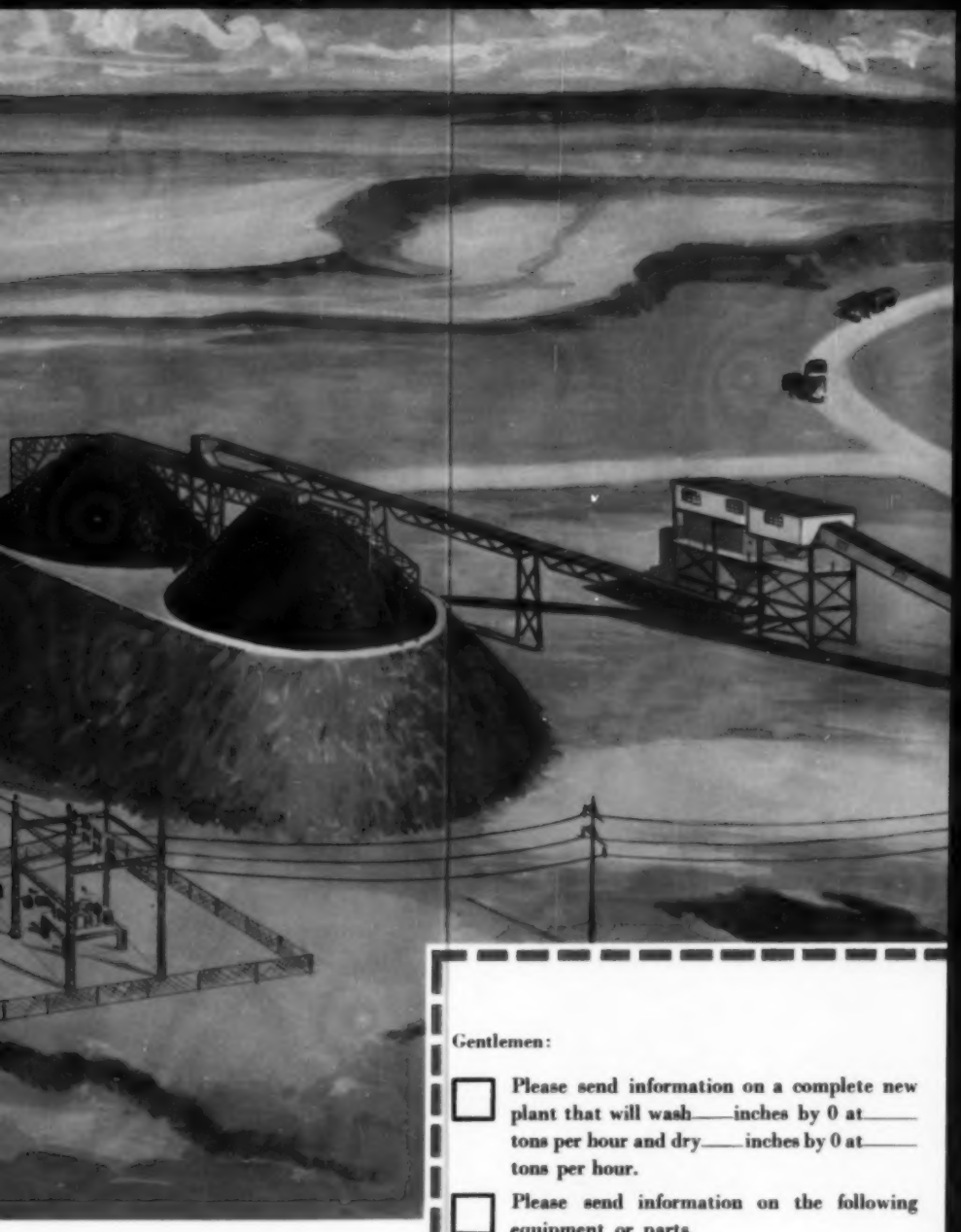

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handling, storage and loading. They
with your engineers to solve your par-
from the ground up, too. Why not
complete information.

Gentlemen:

☐ Please send information on a complete new plant that will wash____inches by 0 at____ tons per hour and dry____inches by 0 at____ tons per hour.

☐ Please send information on the following equipment or parts.

Name _____

Title _____

Company _____

City and State _____

☐ Have Sales Engineer call for further consultation.

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Preparation Is Our Business

Mail Post Card for Information

1. Complete plants
2. Equipment
3. Parts

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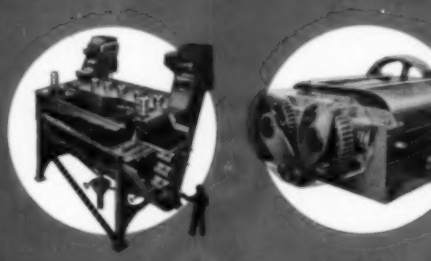

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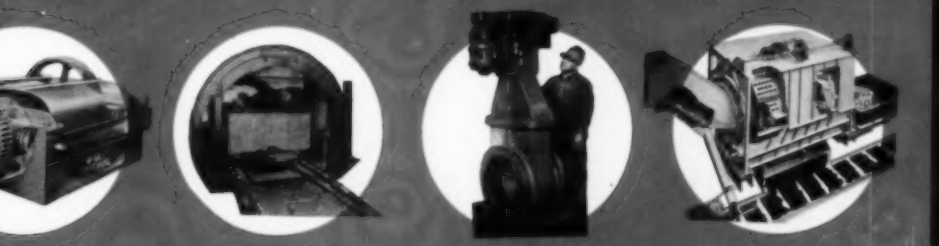

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PLANTS—EQUIPMENT—PARTS

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es: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

What does handling coal FROM THE GROUND UP mean to YOU?

FROM THE GROUND—TO THE CARRIER
From "crude" coal to any desired fuel refinement—large or small—slow or fast—The Men at McNally have the KNOW-HOW—Have Done It for GREATER PROFITS for McNally Customers

COMPLETE PLANTS—EQUIPMENT—PARTS

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation — Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

Ten coal-hauling trucks of USS MAN-TEN* Steel do the work of 60 at one-half the cost!

Three years ago, ten big Dart Model 50 S-BDT trucks were put into service by Sunnyhill Coal Company at their New Lexington, Ohio, workings. These ten trucks, now working a single 7¼-hour shift, replaced 30 smaller trucks which had been working two full shifts per day. The smaller trucks consisted of eighteen 25-yard end-dumps and twelve 14-yard capacity trucks.

Each of the Dart trucks has a capacity of 50 tons of raw strip-mined coal per haul. The haul is approximately 3½ miles, and each truck makes 14 to 15 trips per day.

In three years of constant service, not one of the Dart trucks has broken down. None has required repair or rebuilding in any way—and all are still in perfect condition. Each truck hauls an average 120,468 tons of coal per year, and makes an average of 3,172 trips annually. Fuel consumption, tire wear, maintenance and labor have been cut substantially.

This is another typical example of how USS MAN-TEN Steel has solved a critical weight problem. These huge trailer units are designed for maximum tire capacity, which is the weight of the unit plus a 50-ton payload. Thus, any weight decrease in the trailer would cause a proportionate payload increase.

Here are the hauling costs per ton-mile of the old and new trucks, averaged over a three-year period:

	OLD (30 smaller trucks working two shifts)	NEW (10 Darts working one shift)
Truck Operation	4.5¢	2.1¢
Truck Maintenance	6.2¢	2.3¢
Road Maintenance	1.9¢	1.5¢
Total	12.6¢ per ton-mile	5.9¢ per ton-mile

Each Dart trailer weighs about 13 tons without tires. Constructing 75% of it from USS MAN-TEN Steel effected an over-all weight saving of 15% per trailer.

In effect, the use of USS MAN-TEN Steel has increased the payload by 15% at no sacrifice of strength and without affecting tire life and efficiency. To increase the service life of all types of heavy-duty mining equipment without increasing dead weight, investigate USS High Strength Steels — MAN-TEN, COR-TEN and TRI-TEN "E." Each has characteristics for solving individual operating problems. Before you buy new trucks, get the information on these steels by writing to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa., or contact the District Office nearest you.

*Trademark

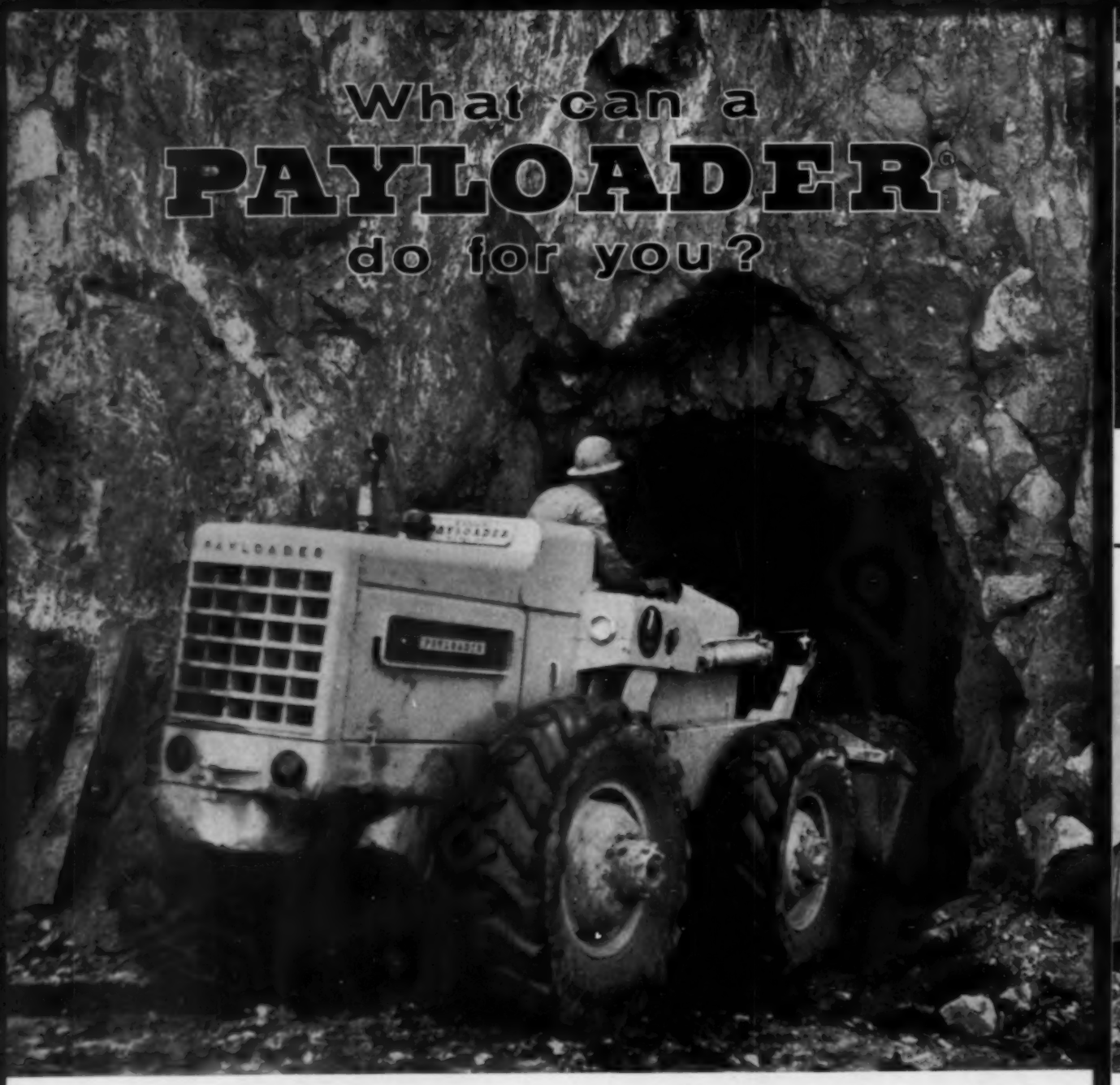
UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS HIGH STRENGTH STEELS

MAN-TEN • COR-TEN • TRI-TEN "E"

7-227

UNITED STATES STEEL



Versatility — the ability to do many earth and material handling jobs, and ***mobility*** — the speed and ease with which they get to the job, are big reasons for the success and acceptance of rubber-tired tractor-shovels at pits, plants and tipples. Mining men also like rubber-tired equipment because it doesn't chew and grind surfaces and greatly reduces dust conditions.

And among rubber-tired tractor-shovels, none can match the versatility, mobility and productive capacity of the new four-wheel-drive "PAYLOADER" units, size for size.

More reliable traction . . . easier, faster and safer operation . . . greater digging power . . . more carrying capacity, are some of the many outstanding improvements in these four-wheel-drive units that are making friends every day among mining operators who know tractor-shovels best.

Your "PAYLOADER" Distributor wants you to prove on your own work that these new "PAYLOADER" models are the most useful, productive and profitable tractor-shovels you can own. Call him today for a demonstration.

It can strip overburden or clean off veins . . . spread, windrow or stockpile . . . carries its bucket loads and puts them where needed.

It can dig payloads of light *or* heavy materials . . . thanks to tremendous pry-out, break-out force and 40° tip-back of bucket at ground level.

It can spot and switch cars — walk across tracks. Ready pushing and pulling power to boost stalled trucks and skid equipment.

It can load gondolas, trucks, hoppers and conveyors . . . travels fast with heaped loads carried low and close for safety and stability.

Full of "MORE YARDAGE" features

Exclusive power-transfer differentials provide sure-footed traction on mud, gravel, ice and snow.

Hydraulic load-shock absorber cushions the loaded bucket, smooths the ride—permits higher carry speeds with less spillage.

No-stop power-shift transmissions can make ALL shifts on-the-go, under full engine speed. No stopping for RANGE SHIFTS . . . no "clutching".

Powerful 40° bucket pry-out, break-out action . . . Rugged planetary final drives . . . Power steering . . . 4-wheel power brakes.

Owners expect more from a "PAYLOADER" and they get more because more of them are in service than all other makes combined. They're designed right and built right . . . they're sold and serviced right by a nearby "PAYLOADER" distributor.

PAYLOADER®

MANUFACTURED BY

THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.

735 Sunnyside Ave., Libertyville, Ill.

Send data on 4-wheel-drive "PAYLOADER" tractor-shovels as checked.

- ☐ HO (2¼ yd. payload, 1¾ yd. struck)
- ☐ HH (1¾ yd. payload, 1½ yd. struck)
- ☐ HU (1½ yd. payload, 1 yd. struck)

Name _____

Title _____

Company _____

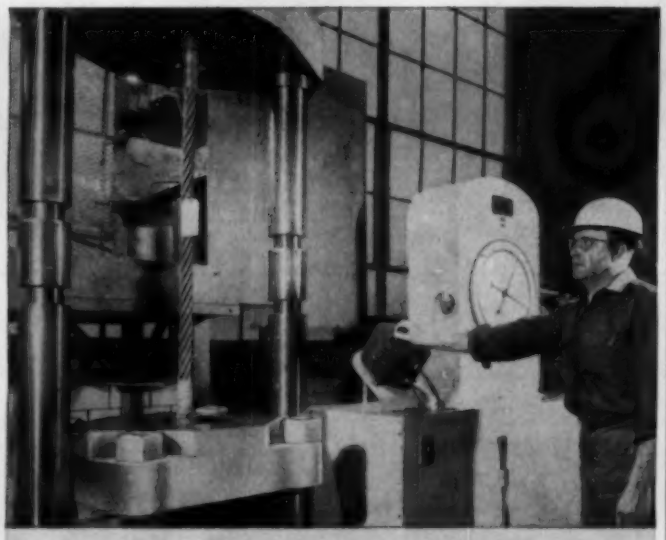
Street _____

City _____ State _____

59

Why J&L wire rope service life

Fatigue machine. This 6 x 25 I.P.S. fiber core rope is being subjected to a continuous fatigue test to determine the number of reversed bends before breakage.



Cross-section tension test. This 1¼" 6 x 41 I.P.S.-RL fiber core rope was tested to 140,000 lbs. tensile load. Catalog requirement for same rope is only 123,000.

Vibration fatigue test subjects this boom pendant assembly to repeated shock loading. The 2,500 ft. lb. load provides action simulating actual field conditions.

Tension test of individual wires shows pounds of tensile load withstood before breaking. Every coil of wire used in J&L wire rope is thoroughly tested before acceptance.

salesmen can talk with confidence

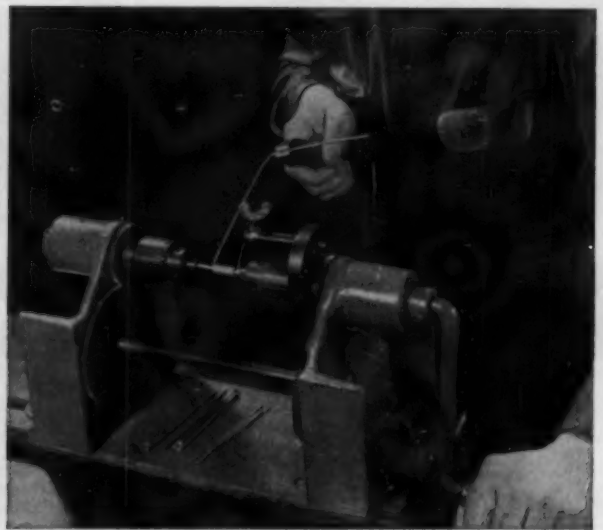
To users and buyers of wire rope, safety and long rope life are all-important considerations. When you specify J&L, you can be confident you are buying wire rope that will stand up to the job for which it is made.

Every strand of J&L wire, every finished wire rope, is subjected to exacting tests to determine maximum factors of strength, flexibility, abrasion and corrosion resistance. This quality control is a most important operation in the production of J&L wire rope. Shown here are some of the tests that enable your J&L wire rope salesman to talk about quality with confidence.

The next time you buy wire rope, call your nearby J&L representative, or write direct to the Jones & Laughlin Steel Corporation, Wire Rope Division, Muncy, Pennsylvania.

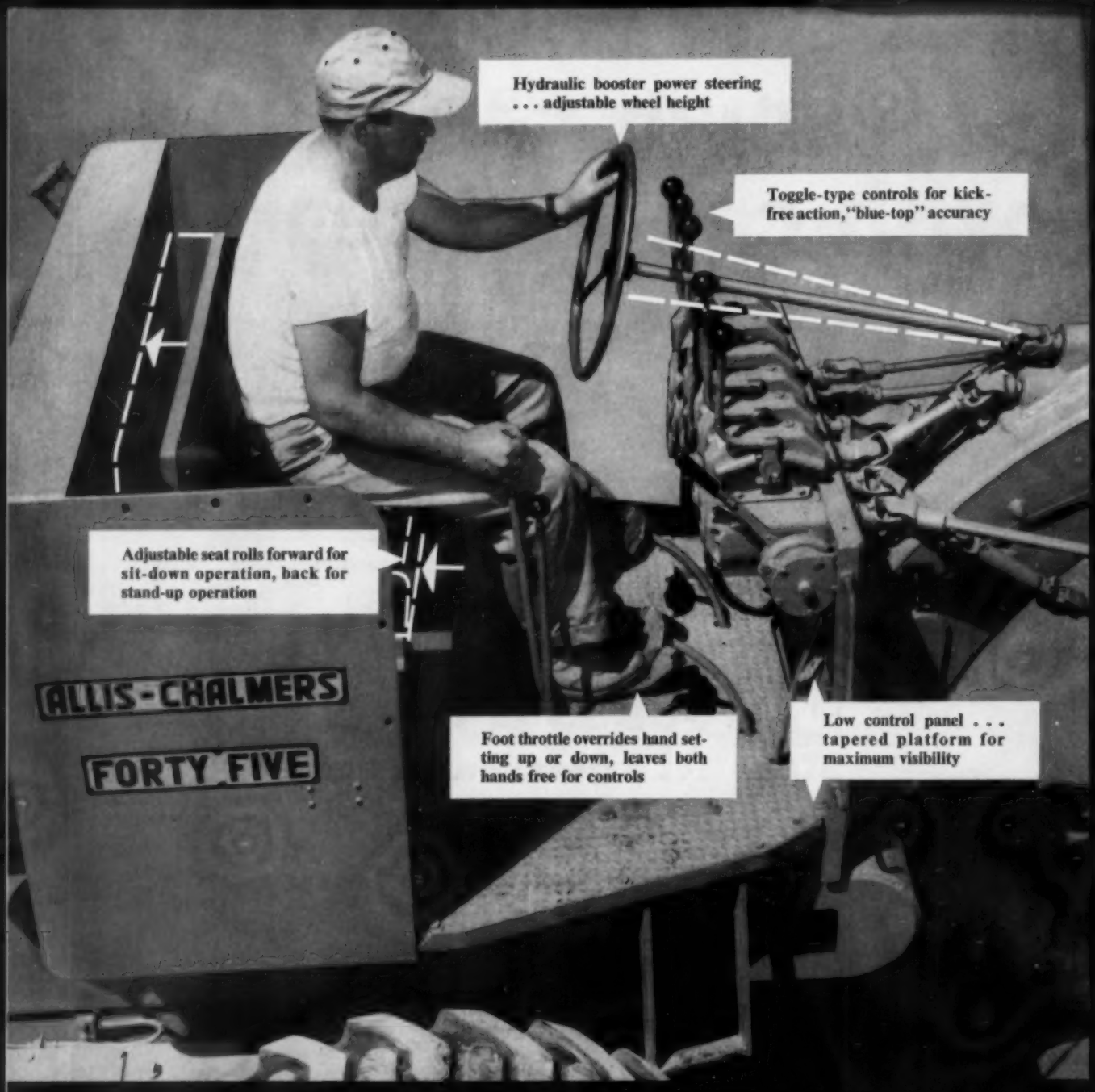
Jones & Laughlin
STEEL . . . a great name in steel

Torsion machine tests ductility by twisting wire. This 8" length of .081 wire took 41 revolutions before snapping. Federal standards require only 26 revolutions.



Wrap test. Galvanized wire is wound eight times around a mandrel of its own diameter and then unwrapped, proving ductility of wire and the bond of the coating.

(Protective screens removed during photography.)


Hydraulic booster power steering . . . adjustable wheel height
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Adjustable seat rolls forward for sit-down operation, back for stand-up operation
ALLIS-CHALMERS
FORTY FIVE
Foot throttle overrides hand setting up or down, leaves both hands free for controls
Low control panel . . . tapered platform for maximum visibility

FIVE WAYS YOU CAN BOOST GRADER PRODUCTION

. . . through operator comfort and control!

Features like these make satisfied operators . . . mean more production for you. They're yours in an Allis-Chalmers FORTY FIVE—120 brake hp, 23,800 lb. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

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Keep out power-robbing deposits in your heavy duty Diesels. Refill with Sinclair SUPER TENOL® for the tough jobs! It helps to eliminate deposits of carbon, varnish and sludge that impair engine efficiency. SUPER TENOL is specially engineered to fight the effects of high temperature, engine over-load and continuous stop-and-go operation. Your engines last longer!

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SUPER TENOL MOTOR OIL

PERFORMANCE

MOST VERSATILE PERFORMERS in Republic's complete line of mine roof bolts are the exclusive forged wedge-head bolt shown at left, and the square-head bolt with wedge nut and rigid expansion shell at right. Other types include the slotted mine roof bolt and the conventional bolt and expansion sleeve shell.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

TESTED

REPUBLIC ROOF BOLTS

INCREASE ROOF-CONTROL RELIABILITY

The reliability of your bolted mine roof is directly dependent on the holding power of the roof-bolt assembly you choose. This simple fact points up the vital necessity of selecting your assembly on the basis of performance—performance proved by exhaustive testing and actual field experience.

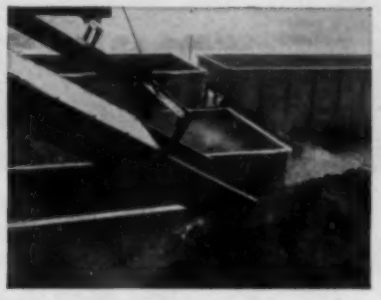
Republic maintains a continuing testing program covering every classification of mine roof bolts. Started well before a new design is put on the market, prototypes are extensively tested in our own mines. Data is collected not only on bolt performance but method of placement and spacing as well, for the various strata conditions to which the unit is particularly well adapted. Finally, records are kept to verify satisfactory long-term service.

The result is outstanding performance—your assurance of increased roof-control reliability when you use Republic Mine Roof Bolt Assemblies. In addition, you can secure the services of a Republic specialist to run tests in your mine and recommend the type or types best suited to your conditions, along with proper placement techniques.

Take full advantage of performance-tested mine roof bolts. Specify Republic on your next order. Contact your Republic representative or mail coupon for further information.

TROUBLE-FREE PERFORMANCE of hoisting equipment is easier to secure when a ready-made Truscon Steel Building is used to provide maximum shelter. It assures safety, prevents tampering, and affords complete protection from the elements. Low-cost Truscon buildings are easy to erect—or dismantle and re-erect to meet changing conditions. Send coupon for data on the wide variety of designs available.

ELECTRICAL CIRCUIT PERFORMANCE is guarded two ways by "Dekoron®-Coated" ELECTRUNITE® E.M.T. First, its extruded polyethylene plastic coating protects against fumes, gases and vapors. Properly installed, with couplings wrapped in plastic tape, the circuit is sealed against corrosion from end to end. Second, the E.M.T. protects enclosed wires with the mechanical strength of steel. Installation is quick and easy, requires only ordinary tools.



COAL-CHUTE PERFORMANCE is greatly improved through use of Republic High Strength Steel. For example, these chutes are subject to day-in, day-out pounding of raw coal. Republic High Strength Steel gives them maximum resistance to this abrasion. In addition, chutes are far more corrosion resistant and lighter in weight than use of ordinary carbon steel would allow. Send coupon for facts.

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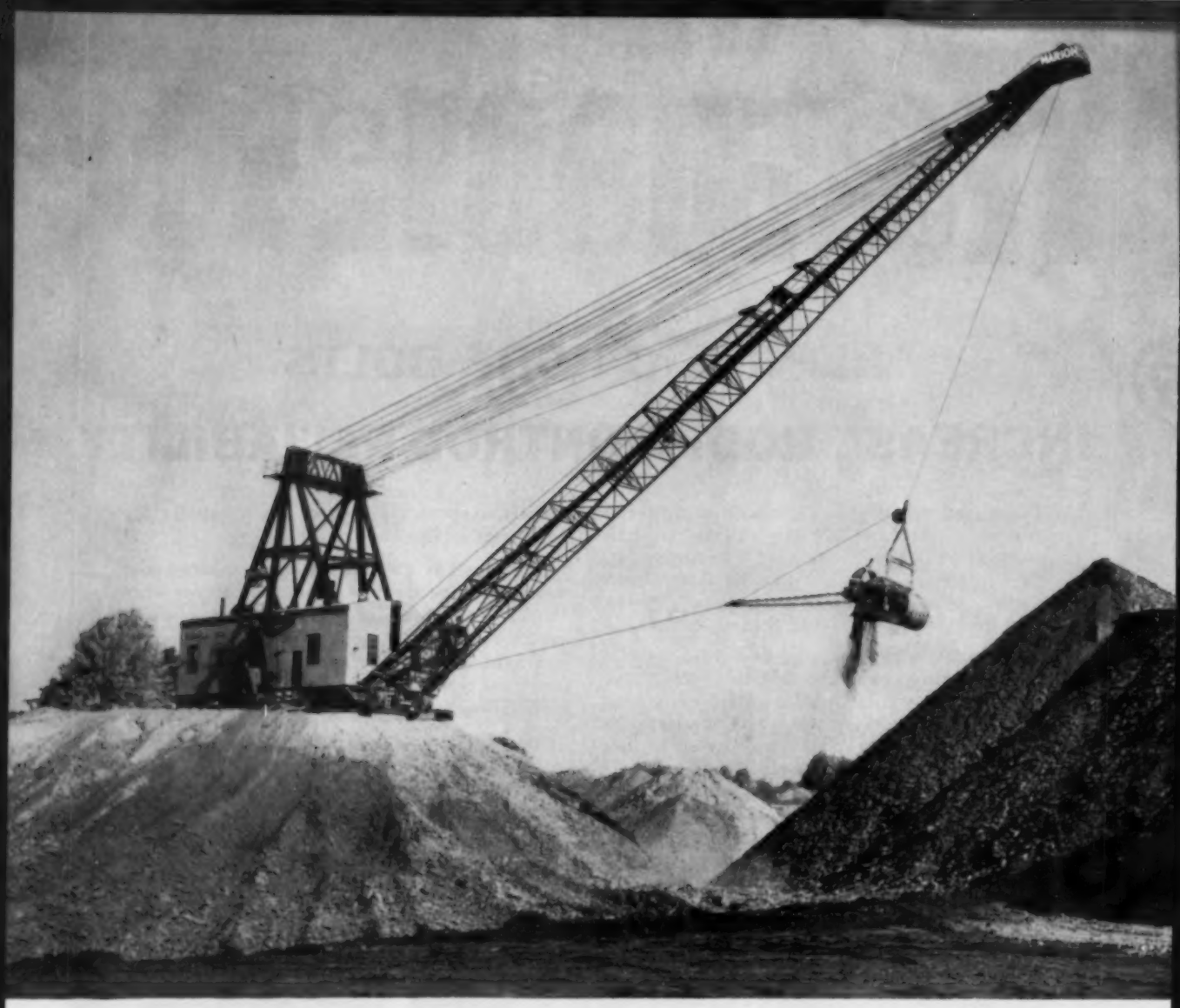

Modern Walker Speeds Strip Mining

Efficient, up-to-date equipment makes coal strip mining profitable. This Marion Type 7400 walking dragline works a double cut, uncovering two seams at a large-scale operation in southeastern Ohio. This big dragline's 175-foot boom carries a 13 cubic yard bucket.

Marion 43-M equipped with 1¼ yard dragline bucket on 60-foot boom. Ask for information about Marion machines to fit your size and front-end requirements.

CONSULT MARION MINING SPECIALISTS *for lower costs on your property!*

MARION POWER SHOVEL COMPANY—MARION, OHIO, U. S. A.

EATON 2-SPEED AXLES

Keep Trucks Out of the Shop!

Whenever you cut down on wear and tear—keep trucks on the job, out of the shop—you're adding to profits three ways: 1—By keeping trucks *earning*, not *costing*. 2—By saving the expense involved in interrupted service and delayed trips. 3—By cutting actual parts-and-labor maintenance costs.

That's exactly what Eaton 2-Speed Axles do. By furnishing the *right* gear ratio for every operating condition, they reduce stress and wear on engines and all power transmitting parts. In addition, Eaton 2-Speed Axle trucks last longer, haul more at lower cost, and are worth more on the trade-in.

It all adds up to this: when you specify Eaton 2-Speed Axles, you're swapping *expenses* for *profits!*

More than Two Million Eaton Axles in Trucks Today. For complete information, see your truck dealer.

EATON — AXLE DIVISION — MANUFACTURING COMPANY
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PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Change motors in minutes—

with FALK *all-steel* MOTOREDUCERS

No long and costly "down time" involved

Motors can be interchanged or replaced *in minutes* with the all-steel, All-Motor type FALK Motoreducer. No long and costly "down time" is involved in making the change!

Best of all, replacement is not limited to original make of motor—new NEMA frames may be substituted for old. This versatile Motoreducer operates with any make, speed or type of standard foot-mounted motor within its AGMA rating. No modification, no special shaft, no "partial" motor required.

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Furnished in sizes up to 75 hp with any make, style or type of motor; or, *without a motor if desired.* FALK Motoreducers are available from convenient factory, field or distributor stocks, from coast to coast.

Write for Bulletin 3100

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

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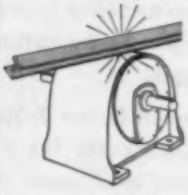
FALK "IN-BUILT" FACTORS assure full dependability—better service—longer life



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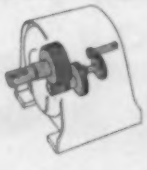
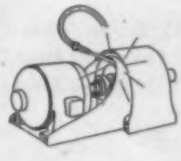
Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum loads.



PRECISION GEARING
Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion.



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He knows exactly the rope to best fit your equipment for greatest wire rope service. He maintains stocks of standard strength Yellow Strand, Yellow Strand "POWERSTEEL" and Yellow Strand Flattened Strand to promptly supply your needs.

Add to that the extra qualities of wear resistance, shock resistance and long life manufactured into Yellow Strand products and you have a hard-to-beat combination.

Wherever your job may be Yellow Strand is near at hand. Distributors and factory warehouses are located throughout the entire U.S.A. Call them for the service of an expert, and longer rope life.

Where you see Yellow Strand at work, you'll see wire rope records of long life and dependability. Steady, day after day performance proves Yellow Strand's toughness, ability to "take" shock and wear of heavy loads.

Yellow Strand®

BRODERICK & BASCOM ROPE CO.

Manufacturers of Wire Rope for over 80 Years

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Fairbanks-Morse fire pumps provide 12,000 gpm. of water at 100 psi. for each of two systems.

World's largest jet aircraft center protected by F-M fire pumps

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Maximum protection against fire at this gigantic operation was achieved at minimum cost by installing two identical, interlocking water supply systems, each equipped with Fairbanks-Morse pumps for both water supply and sprinkler pressure.

The size and scope of this installation indicate Fairbanks-Morse's ability to supply fire pumps for all magnitudes of industrial and municipal requirements. Whatever your needs in fire protection—big installations or small—your Fairbanks-Morse Field Engineer will be glad to work with your own engineers, in specifying the most efficient equipment. Call him today, or write Fairbanks, Morse & Co., Dept. CA-4, 600 So. Michigan Ave., Chicago 5, Ill.

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The Euclid TC-12 gives you more work-ability than other Crawlers

The first really new tractor concept in years... with ALL the performance features you've wanted

Euclid's Model TC-12 Twin-Power Crawler establishes an entirely new standard of tractor performance. It's built to deliver unequalled drawbar horsepower, easy operation and a smooth, steady flow of power to meet any job requirement. It provides easy accessibility of all major components and all lubrication, check and adjustment points are located for maximum convenience. Unitized assemblies permit service or removal without a major tear-down of other parts.

Powered by two 194 h.p. engines at rated speed, 365 h.p. is delivered to the power train. Each of the tracks is driven independently through separate Torqmatic Drives giving the TC-12 faster, easier steering and greater drawbar pull at higher speed. There's no clutch—shifting from one of the three speed ranges to another is done under full power —top speed in forward or reverse is 8.3 mph.

Have your Euclid dealer give you all the facts on the TC-12—compare with your present big tractor equipment and you'll know why so many owners have proved that ***Euclids are your best investment.***

EUCLID DIVISION, GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Hook up your holes for *better digging*

PRIMACORD®
DETONATING FUSE

This hole is awaiting *your* orders. It is loaded and ready to "go," but it won't "listen" to stray electric currents, or even to lightning . . . it's primed with Primacord.

When it does go, it will fire in its proper sequence because it is hooked up to a Primacord trunk line which connects all holes in a fire pattern designed to insure relief of burden — produce better fragmentation, *better digging*.

THE ENSIGN - BICKFORD COMPANY
Simsbury, Connecticut • Since 1836

Primacord® Detonating Fuse, Ignitacord®, Quarrycord, Safety Fuse, Pyrotechnical Devices and Blasting Accessories

The square knot is used only above ground, to lengthen a trunk line of Plain or Reinforced Primacord, or to tie in Primacord M S Connectors. It must be drawn up tight.

Plain Primacord Trunk Line. Is used also for shallow holes — wherever resistance to abrasion and cutting is not required. Textile covered, flexible, resilient, with a tacky non-slip surface. Tensile strength 140 lbs — 1000 ft. spool weighs 17 lbs.

Plastic Wire Countered Primacord Branch Lines — Used in deep, ragged holes — and especially where metal or rigid fibre explosives containers are used — wherever strength and resistance to abrasion and cutting are essential. Armored with wire and covered with plastic material. Tensile strength 300 lbs — 1000 ft. spool weighs 33 lbs.

The knot shown is the clove hitch made in the Plain Primacord trunk line and drawn tightly around the twin branch lines.

P-1

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

APRIL, 1957

IVAN A. GIVEN, EDITOR

Jam Broken

OTHER GOOD IDEAS may have been dogged by more troubles than American Coal Shipping, but the ACS list is a long one. In addition to opposition from other vessel operators and disinterest and opposition in some government circles, the organization has been subjected to harassment by labor unions on a near-record-breaking scale.

Thus, an idea with more than the usual benefits has been set back many months, with consequent losses to coal producers and railroads in the United States, as well as to purchasers abroad. This conclusion is not altered by the good news, reported elsewhere in this issue, that the labor log jam has at least been broken and ACS can now resume progress toward its service and cost goals. These include realistic ocean freights, improvements in ports and facilities here and abroad, and final solidification of the position of U. S. coal n European and other overseas markets. Producers, transporters and purchasers will gain in an almost unparalleled spreading of benefits. The fact that this happy conclusion has been long delayed by selfish union tactics is a further indication that wise curbs are becoming more and more a necessity.

Big Step

HOW MANY COAL PIPE LINES will be built or started in the next five years? Completion of the Hanna line, to be dedicated April 9, makes this a very pertinent question. The speculation would indicate at least one and perhaps two or three more in the not-too-distant future. Thus, for example, lines from the Pittsburgh to Philadelphia and New York, and from the southern coal fields to the coastal industrial centers and ports, have been noted as logical possibilities. In fact, they might be viewed as probabilites in view of the savings that undoubtedly will flow out of the operation of the Hanna line.

Pipe-lining thus could be a giant step forward for coal, since the cut in transportation costs is of a magnitude that would mean moving coal into an almost impregnable position in certain markets, in addition to opening up new areas now difficult to serve because of distance from producing centers. Thus, it might make sure that attempts to convert Florida utilities into coal users would be crowned with permanent success. Coal-line mileage probably never will approach oil and gas mileage, but it could have a major effect on the industry's prospects for tonnage in the future.

For You

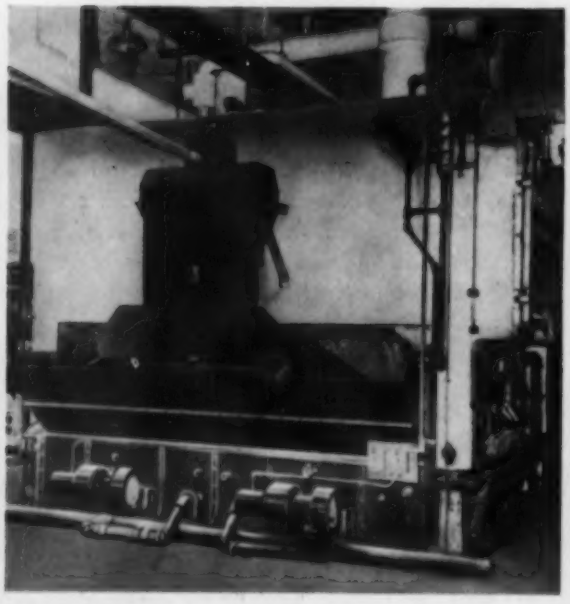
THIS YEAR, in twelve regular issues and the Mining Guidebook, *Coal Age* will bring you over 2,500 pages of material, editorial and advertising combined. Regardless of whether it is editorial or advertising the aim is to provide coal men with information on methods, materials and equipment that is down to earth, up to date and useful.

After the editors and manufacturers have done their best you as the reader must complete the cycle if the time, talent and money represented by each page in each issue of *Coal Age* is to yield the return you have the right to expect. The answer? Check each issue thoroughly and carefully. To help you, the editors, among other steps to make reading easier and facts easier to spot, now digest the contents in a special expanded contents section. *Coal Age* is published for you, which is why we urge this careful checking. It is the best of all ways to get out of it all there is in it.

1. Industry-Wide

JOINING FORCES to sell Anthracade visitors the fine points of automatic burning equipment: Stanley Rucker (left), fuels engineer, Blue Coal Co.; and Anthony Cheli (second from left), retailer, Vineland, N. J.

Three of the Basic Needs to Promote . . .



2. Commercial Sales Push

EXEMPLIFYING anthracite's market in large space heating, this installation at No. 2 School, Elmira, N. Y., features a fire jet stoker with overhead pneumatic feeder.

3. Consumer Contact

SPARKPLUGGING industry drive, Norm Curtin (right), fuels engineer, Anthracite Information Bureau, explains the use of a modern hard-coal burner to a commuter.

Cooperation

JOINING FORCES to exchange ideas at an industry conference: Douglas Breed (left), retailer, Elmira, N. Y.; Harold Wentz, Electric Furnace-Man, Inc.; John Hassett, retailer, Elmira, N. Y.; Joseph Corgan, USBM.

Anthracite For Space Heating

PROBLEM: How to prevent erosion of the space heating market

SOLUTION: Unite the entire industry for the common sales good
Concentrate on developing the commercial market but don't neglect hand-fired tonnage
Expand the job of taking the story of modern equipment to those who buy or influence the buying of anthracite

By W. A. RALEIGH JR.
Assistant Editor, *Coal Age*

A STABLE SPACE HEATING MARKET—possibly rising by 2 to 3 million tons—is within anthracite's grasp during the next 5 yr. Achieving this market state, however, will depend on how readily and effectively the industry gears its product promotion and public relations program to:

- Convince commercial fuel buyers that anthracite and anthracite equipment are a modern, clean, efficient, dependable fuel-burning combination.
- Hold present home-fired tonnage.
- Exploit price advantages over competitive fuels.
- Aid retailers in selling and servicing their customers.
- Gain active support of industry-wide sales promotion from small tonnage and "split-business" (coal, oil, lumber, etc.) dealers.
- Show wholesalers and retailers how closer identification with equipment sales—especially to commercial outlets—will lead to more customers and a higher volume of orders.

For a digest of this and other features in this issue of *Coal Age*, see the expanded contents section, pp 5, 7 and 11.

Anthracite space-heating sales to homes and commercial outlets in the U. S. and Canada reached an estimated 20 million tons in 1956—about 73% of total tonnage. Some analysts look for the home-heating market to level off or dip slightly during the

CONCENTRATE ON PUSHING COMMERCIAL SALES. Fuel, equipment and maintenance advantages have opened a new growth market for anthracite in large space heating. With adequate promotion, growth might average 400,000 to 600,000 tons annually during the next 5 yr.

Sales Policy for Space Heating . . .

DON'T NEGLECT HOME-HEATING TONNAGE. If the 1,300,000 hand-fired customers are kept well-informed on modern hard-coal use, many will switch to automatic equipment; others will avoid converting to higher-cost oil or gas burners.

next 5 yr; others see a substantial drop more or less inevitable. Most agree, however, on the potential for growth in commercial or large space-heating use — schools, hospitals, churches, apartment houses, banks, government buildings, etc.

Here is the touchstone for preventing erosion of the space heating market. An all-out, industry-wide push in commercial sales could (1) compensate for possible losses in the home-heating market, or (2) boost total space heating sales by 2 to 3 million tons if home-fired tonnage remains about the same.

In either case, far-sighted producers should alert themselves to the possible need for revising size-production schedules to meet greater tonnage demand in the commercial market which is based on the use of rice in automatic equipment.

Think Prosperity

Basic to firming up the space-heating market and developing a harder-hitting merchandising effort is a change in approach. Anthracite must wake up from a 10-yr siege of "depression-itis" and condition its thinking to prosperity. "Depression-itis" grew out of the severe dive in market demand: from 61 million tons in 1946 to 25 million tons in 1955. Now, a coincidence of favorable marketing signs indicate that the basis for depressed thinking has disappeared. These signs include:

1. The first upturn in production in 6 yr—from 25 million tons in 1955 to 28 million tons in 1956.
2. The fast growth in overseas demand—from 700,000 tons in 1955 to 2,900,000 tons in 1956.
3. Rising prices for competitive fuels—an advantage now accentuated, in the case of oil, by the Middle East crisis.
4. Widening consumer acceptance of automatic anthracite-burning equipment—unit sales of which have risen for 31 consecutive months.
5. The rapidly-increasing interest in anthracite as a sintering fuel, coke blend, blast-furnace charge, and source for gas in the direct reduction of iron ores.
6. The firmer crackdown on air pollution, as planned, for example, by the New York State.

Pull Together

Cashing in on this favorable marketing scene will require a stronger industry-wide sales push than now apparent. This means that all components of the industry — producers, wholesalers, retailers, equipment manufacturers, etc.—must pull together for the common sales good. It also means that producers must abandon the outmoded concept of rugged individualis min selling.

Rugged individualism has kept producers from going beyond token acceptance of group selling action for fear of losing their individual merchandising identities. In more extreme form, it has taken producers into dumping and price slashing. Both forms of rugged individualism in selling create a house divided—unable to attack competition effectively and to develop full market potentials.

The first step in braking rugged individualism was applied last year in a production-control plan sponsored by the State of Pennsylvania. Under this plan, each major producer voluntarily accepted a "percentage position to supply market demand."

Production control on a "gentleman's agreement" basis is a good and necessary start. But the possibility of a break in this agreement is ever-present. Producers should, therefore, strive for a firmer understanding on the orderly marketing of their production. They should also extend the spirit of mutual cooperation to embrace a stronger industry-wide promotion program.

The following roundup highlights the status of anthracite's efforts to promote its product and recommends how these efforts can be improved upon and expanded.

Present Program

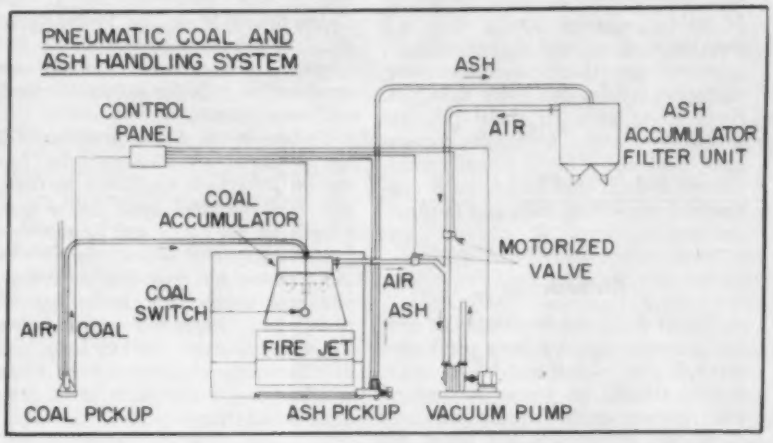
Broad Objectives

The nucleus for a more effective, industry-wide sales promotion program has been available for some years through the Anthracite Information Bureau. The bureau, with headquarters in New York City, is sponsored jointly by producers and retailers, and acts under the direction of the Anthracite Industry Council.

Since 1953, AIB has conducted a

Equipment Pioneers

MANUFACTURERS pioneering the development of automatic anthracite-burning equipment include Electric Furnace-Man, Inc.; Losch Boiler Co.; Motor Stokor Co.; Combustion Engineering Co.; and Illinois Stoker Co. These companies now offer a complete line of stokers and automatic coal- and ash-handling equipment to meet needs ranging from the home owner to the largest space-heating consumer. Harold Wentz, Electric Furnace-Man, Inc., reported one of the most recent developments (below)—a pneumatic coal and ash handling system—at the Penn State Anthracite Conference last October. Mr. Wentz said the system is now operating successfully in schools at Dayton, Ohio; Port Huron, Mich.; Avoca, Elmira and Watkins Glen, N. Y.; and at other localities.



THE PNEUMATIC CONVEYOR SYSTEM above was developed by EFM for use with Fire-Jet burners. It uses a 4-in mercury-vacuum 300-cfm multistage centrifugal exhauster. This size vacuum unit is capable of delivering coal to and removing the refuse from two boilers using 1,300 lb of rice anthracite per hour per boiler. It is the maximum size for any one boiler using the water-cooled conversion grate. The minimum coal delivery rate is fixed at 80 lb per min per boiler (two conveyor lines) and the minimum ash delivery rate at 15 lb per min.

well-conceived and aggressive product promotion and public relations program designed to reach those who buy, or influence the buying of space-heating fuels: consumers (owners of homes and commercial buildings), professional groups (architects, consulting engineers, building contractors, and building committees (for schools, churches, apartment houses, office buildings, etc.).

In contacting these groups, AIB's main job is to combat the widespread notion that anthracite is an outdated fuel. This is done through the gamut of public relations media including traveling and railroad station exhibits, press releases, slide and movie films, magazine articles and sales data kits. Each effort aims to show (1) that anthracite and anthracite-burning equipment are a modern fuel combination; and (2) that anthracite is economical, smokeless, safe, and in plentiful supply.

Anthracade

One of AIB's outstanding sales promotion campaigns has been conducted through the "Anthracade"—a 45-ft mobile display of automatic anthracite heating units. During the past 2 yr, the Anthracade has taken the story of modern hard-coal burning equipment to present and potential consumers in 72 cities and towns in eastern Pennsylvania, New Jersey and New York. Late in 1956, with the mobile display still going strong, AIB reported:

"Hand-fired equipment, Operation Home Improvement displays, and the Vacuum Ashaway have been added to the Anthracade equipment displays and created great interest at the first fall engagement at the Watertown, N. Y., Fair. Reconditioning of present hand-fired jobs and thermostat installations came in for a lot of attention and approximately 30% of the equipment leads were for new hand-fired furnaces. The Ashaway was a real hit. It is set up to operate manually and shows the vacuuming out of the pit. It is estimated that at least six Ashaway sales will be made as a result of the exhibit in Watertown." (Ed. Note: Volume growth in Ashaway sales may depend on whether or not the industry can develop a large enough market for the equipment to permit mass production at lower cost.)

Schools

AIB is now engineering an all-out drive to push sales in the school market. Here, the swing to anthracite is catching on fast in New York, Pennsylvania, New Jersey, New England states and Eastern Canada.

At the Penn State Anthracite Conference last October, John Hassett and Douglas Breed—Elmira, N. Y. retailers—disclosed that 32 school boards in the State of New York had visited Elmira to benefit from that town's anthracite-burning experience which encompasses all of its 12 schools (*Coal Age*, December, 1956, p 87).

Besides Elmira, other cities and towns known to have swung their school systems completely to anthracite include Syracuse, N. Y. and Georgetown, Mass. In Philadelphia, Pa., all but one of the city's 241 schools use anthracite, and all new construction calls for automatic hard-coal equipment.

To beef up its school program, AIB has prepared an 80-page sales promotion kit which spells out in detail just what retailers must do to keep schools on hard coal and to stimulate future equipment sales. Merchandising aids include cost data on anthracite and competitive fuels, testimonials, and suggested presentations for school boards. The kits have been distributed to wholesalers from whom retailers can order units needed for sales solicitations.

Other Commercial

The swing to anthracite is also spreading to other commercial outlets – apartment houses, hospitals, churches, government buildings, etc. This fact is dramatically portrayed in a sound-slide color film—"The New Look In Property Management" — prepared by AIB. It is also shown by this sampling of recent reports:

The General Mutual Insurance Co., Montpelier, Vt., installed automatic anthracite equipment in a new building after seeing similar installations in a nearby city.

The New York State Housing Authority modernized anthracite installations in its Rochester, N. Y., 484-family development. The authority now boasts that the project has one of the lowest-cost heating bills of all state housing developments.

The General Services Administration specified anthracite water-cooled grates for 11 postoffices and 4 armories in New York and New Jersey.

The Veterans Administration's 15-story, 1,000-bed hospital, Boston, Mass., has a completely automatic installation using 10,000 tons of anthracite annually. Fuel costs are way under those of competitive fuels and labor costs are no more, the hospital states.

A greenhouse convert to anthracite in Brattleboro, Vt., reported that his boiler operated efficiently with only 15 min of labor a day.

The YMCA at Pottstown, Pa., after swinging to anthracite, eliminated its smoke problem and saved $1,000 in annual fuel costs.

St. Luke's Church, Jamesburg, N.Y., in a special pamphlet to its membership, raved about the time-saving, money-saving and cleanliness features of its newly-installed automatic anthracite heat.

The Chittenden Trust Co., Burlington, Vt., reported: "Automatic anthracite equipment reduced our labor cost, requiring maximum attention of ½ hr a day even in extreme weather, and our fuel costs are at a minimum."

Ralston's Flowershop and Greenhouses, Allentown, Pa., stated that automatic anthracite has lowered fuel costs, cut labor costs in half, and eliminated maintenance.

Strong Selling Points

Fuel Cost

Low annual fuel cost is a big selling point in convincing commercial outlets to stay with, or convert to anthracite. Below for example, are typical comparisons of annual anthracite and oil costs per pupil in widely-scattered school areas:

	Anthracite	Fuel Oil
Elmira, N. Y.	$4.74	...*
Port Chester, N. Y.	*	$7.54
Syracuse, N. Y.	5.97	...*
Lancaster, Pa.	4.52	5.99
Philadelphia, Pa.	3.81	4.60
Burlington, Vt.	5.94	9.21
Trenton, N. J.	3.59	5.85

*No school use.

Advantages Over Oil Burner

Much of the swing to coal use in school and other large space-heating outlets is due to increased awareness of the shortcomings of conversion oil burners. Retailers and heating contractors may have grounds for claiming that a domestic stoker costs more than a domestic oil burner. But, in most commercial applications, heating contractors usually agree that equipment, installation and fuel costs for anthracite water-cooled grates are less than those for comparable conversion oil burners in practically all anthracite marketing areas (see table opposite page). Furthermore, oil customers con-

verting to modern anthracite equipment find:

1. That labor costs are no more and, frequently, less. Many metropolitan areas are issuing instructions for oil-burner users, listing what should be done every day, every week and every month for safe, clean efficient operation. If oil-burner users do all the necessary tasks, including the cleaning of air intakes, nozzles, strainers and boiler tubes, much more labor would be needed than with automatic anthracite equipment.

2. That fuel supply is more dependable. This fact was borne out during the fuel-shortage scare occasioned by New York City's February tugboat strike. A survey, conducted by AIB for the benefit of anthracite users, disclosed that: "All leading anthracite dealers in the city's five boroughs are in a position to supply normal customer requirements. This applies not only to home owners who burn rice coal in automatic equipment or large sizes for hand-firing, but also to apartment houses, and more than 700 public schools and public buildings which purchase anthracite on contract through regular dealer channels. Most dealers maintain adequate reserves in storage to meet emergency requirements, and these reserves are now being replenished regularly by truck and rail from nearby mine sources in eastern Pennsylvania."

3. That damage to burners is minimized. The high sulphur content in today's commercial grades of oil causes much corrosion. Result: no small number of parts must be replaced every 2 or 3 yr—a condition virtually impossible with anthracite which has a relatively minor sulphur content.

Freedom From Air Pollution

Owners of large space-heating establishments are also becoming more aware of their community obligations on air pollution. They are impressed to learn—frequently for the first time—that hard coal emits negligible amounts of sulphur and cannot cause soot or smoke under any conditions. Thus, by using anthracite, they automatically conform to smoke ordinances and free themselves of worry over the coming crackdown on air pollution (*Coal Age*, October, 1956, p 54).

Program Needs

Though well-conceived and aggressive, anthracite's industry-wide promotion program is not commensurate with the needs of the space heating market.

Consider this fact: in 1956, the USBM put the mine value of anthracite at $236 million; of this amount, less than one-tenth of 1% was spent on industry-wide promotion.

Also note some conclusions of a consumer analysis study completed last October by Perry Myers, Inc., New York City:

"There is evidence that people are not aware of the advantages of the newer automatic anthracite equipment and of new features that eliminate handling ashes. There seems to be room for a much stronger selling job, reaching not only the present home owners, but also builders.

"We recommend that further research devote greater attention to the buying situation, background knowledge of various fuels and equipment, and also underlying attitudes that affect buying. In particular, such research should attempt to uncover ways of overcoming the attitude that coal is old-fashioned."

Thus, to hold existing customers and to realize a potential 2 to 3 million-ton growth during the next 5 yr, anthracite should:

1. Expand the promotion and public relations work of the Anthracite Information Bureau. Specific needs are: more exhibits and displays, closer liaison with retailers, and a stepped-up program of sales kits and other merchandising aids.

2. Intensify efforts to inform those who buy or influence the buying of coal on anthracite's price advantages over competitive fuels. In concrete terms, this means more presentations to architects, consulting engineers, building committees, heating and building contractors, etc. It also means concentrated effort to tell the story of modern anthracite to the 1,300,000 hand-fired customers who might switch to gas or oil if they do not have the true facts on hard-coal use.

3. Instruct producer salesmen to broaden their concept of selling. Taking more orders for coal is always the immediate payoff. But willingness to handle complaints, provide equipment service and give merchandising aid is usually the best route to holding and increasing long-range business.

4. Campaign for greater participation in sales promotion and customer service work from small and "split-business" dealers. Retailer membership in the AIB represents about 70% of total retail tonnage—an unusually good showing compared to retail representation in similar organizations of other industries. But this membership comes mostly from large and medium-sized outlets in the bigger cities and towns; it does not include enough of the more numerous small-town dealers and dealers handling other lines, such as, oil, lumber, building supplies and miscellaneous household items.

5. Strive to interest more dealers in selling or identifying themselves with the sale of modern anthracite equipment, especially to the commercial market. Many have found: "Whoever sells the equipment gets the business."

Equipment and Installation Costs: How Anthracite and Oil Compare

Sq Ft of Radiation	Anthracite, Water-Cooled Grate	Oil Conversion Burner NO. 4 Oil	Oil Conversion Burner No. 5 Oil
4,150	$1,450	$2,600	
4,970	1,575	2,600	
5,860	1,700	2,700	
6,640	1,750		$3,500
7,460	1,850		3,500
8,300	1,900		4,000
9,100	1,975		4,200
10,000	2,085		4,500

Data compiled by the Anthracite Information Bureau from experience of heating contractors. For purposes of relating the capacity of equipment to annual fuel used, 1 ton of anthracite per year is figured for each pound per hour of stoker capacity. For example, a building using 100 tons of anthracite per year will require a stoker capacity of 100 lb per hr. The same building (100 tons per yr) would require the following hourly oil burner capacities: No. 4 fuel oil burner, 8.65 gal per hr; No. 5 fuel oil burner, 8.45 gal per hr.

LOW-SLUNG self-propelled air compressor with vertically adjustable chassis can be moved about in thin coal without scraping roof or floor. Compressor damage caused by bumping roof or floor has been virtually eliminated.

How Peabody Mines 26-in Seam

THIN SEAM LOADER, teamed with bridge conveyor, provides continuous flow of coal to chain conveyor.

Bridge conveyors and mobile units carry the production load in 26- to 30-in coal at Nos. 31 and 32 mines. Special auxiliary units ease supply handling, equipment moves and cuts maintenance cost.

For a digest of this and other features in this issue of *Coal Age*, see the expanded contents section, pp. 5, 7 and 11.

SELF-PROPELLED chain-conveyor drive is moved in a minimum of time.

BRIDGE CONVEYOR travels back and forth on chain conveyor as loading machine maneuvers in coal at the face.

SUPPLY CAR, designed specially for Peabody conditions, eases handling of conveyor pans, parts and supplies in thin seam. Unit also transports supervisors and mechanics. Closeup below shows design details of 19-in unit.

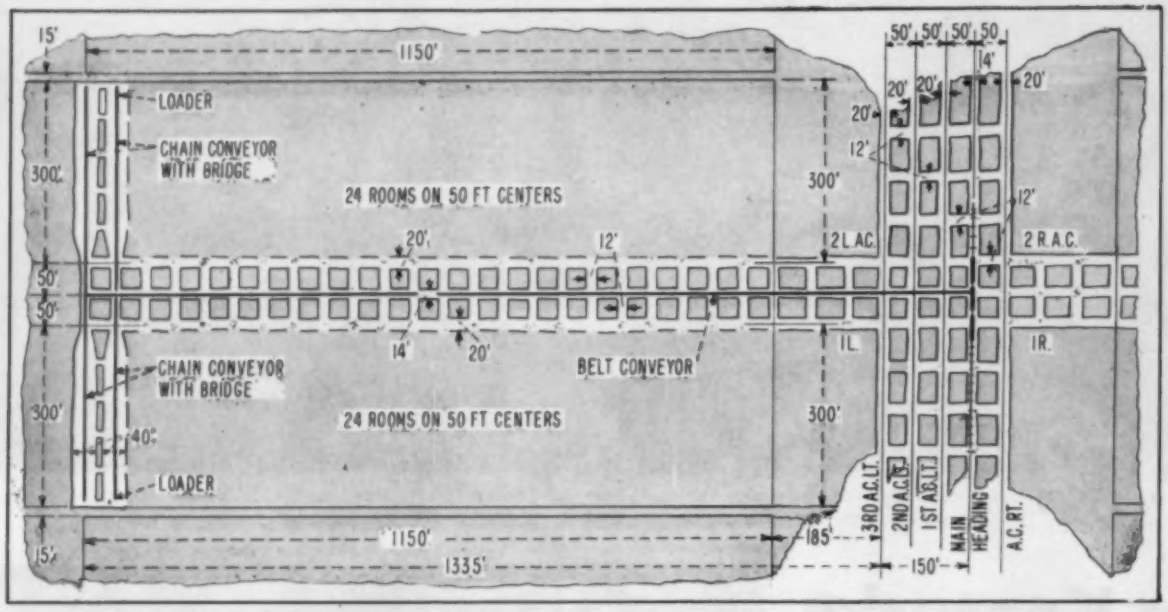
in Kentucky

SPECIALLY DESIGNED auxiliary equipment is teamed with conventional off-track and Piggyback equipment to effectively mine a 26- to 36-in seam of coal at Peabody Coal in eastern Kentucky. For example, low-slung electrically powered three-wheel utility cars ease the day-to-day handling of conveyor pans, chains and supplies. Damage to portable face compressors resulting either from hitting the roof or scraping the bottom has been virtually eliminated by designing and building a special chassis that provides greater maneuverability. Further evidence of Peabody's effort to overcome the inherent disadvantages of mining thin coal is the application of a rope belt that is only 13½ in high.

WHAT THE CONDITIONS ARE

Peabody operates two mines in the Darby, or No. 5, seam at Kenvir, Harlan County, Ky. The seam outcrops at an elevation of 1,700 ft above sea level and pitches 1 to 2% to the northeast. The property is near the Stone Mountain fault and some of the irregular conditions in the mines are believed to be the result of the fault. Among these irregular conditions making mining difficult are seam displacements up to 8 ft, thinning or "pinching out" of the seam so that top rock must be taken for machine clearance, and rolling seam conditions. The company also reports that there usually is a change in roof conditions or a "roll" somewhere in each 1,000 ft of development.

ROPE BELT, only 13½ in high, provides maximum clearance in thin seam. Minimum conveyor parts also simplifies extension or moving in thin coal.



MINING PLAN for room panel using bridge units includes driving pairs of rooms off both sides on retreat.

LOADER and shuttle car team work areas where coal is thicker and in entries.

REGULAR REBUILDING of face equipment is done in company shop.

Aside from somewhat less than favorable seam conditions, Peabody periodically has to contend with weak roof. The best mining conditions are found under sandstone roof but at times the sandstone itself is weak and falls to a height of 12 ft or more. Sometimes there is 10 to 42 in of shale over the coal. This material air-slacks rapidly and adds to the roof-control problems.

The mine floor is usually hard, massive sandstone and provides a solid roadbed for equipment.

Peabody's newest mine, No. 32, taps a huge area of unmined Darby coal and at the present mining rate of 2,500 tpd will last for 20 to 25 yr. But present prospect information indicates that the coal will be only 26 to 33 in thick. For this reason, Peabody is concentrating a lot of effort on developing effective methods to mine the thinner coal.

Coal in No. 31 mine averages 36 in but the reserves in that area are not nearly as large as in the newer No. 32 mine. At most, this mine will last for 3 yr, then all of the coal will have to be mined from the thinner area.

HOW EQUIPMENT IS USED

Peabody relies on conventional off-track and Piggyback units to mine the thin seam. Face equipment in No. 31 mine includes four Long Piggyback and three Joy conventional units; No. 32 mine is equipped with

OIL-TREATING is done as coal drops from loading boom into car. Coal may be treated on any of five tracks.

OFFICIALS George Ledford (left), superintendent, and H. C. McCollum, vice president, discuss mining plans.

one Piggyback and two off-track units.

Piggyback units include a Long 88 Pigloader, PT15B Piggyback conveyor, PT15 chain conveyor with crawler-mounted drive, Goodman 512 cutter with 9-ft bar and Chicago Pneumatic hand-held electric drill.

Purchased primarily for use in room work, the Piggybacks also have been used for entry development. In both entry and room work two places are advanced at a time.

In room work, Piggyback mining proceeds as follows. After the three panel headings are driven 1,500 ft deep, a pair of rooms on 50-ft centers is turned 90 deg off each side of the entry. A Piggyback unit advances each pair of rooms 40 ft wide to a depth of 300 ft. The narrow pillar between the rooms is not recovered.

The room chain conveyors are set up 2 ft off centers to provide a roadway in the center of the rooms for the Long 88 Pigloader which shuttles back and forth between the two rooms. Other equipment remains in each room and men move from place to place as they complete a part of the face cycle.

A typical crew driving a pair of rooms includes a loader operator, timberman, roof-bolter where roof requires bolting, two cutting machine operators, two drillers, who also add pans and shoot the coal, repairman and foreman. A boom man at the belt drive and a supplyman also are included in the section crew.

While a shot cut of coal is being loaded in one room, roof-bolting is started at the right side of the other room. Bolts are ⅝x30-in expansion units and are installed on 4-ft centers. Bolt holes are drilled with a Cleveland stoper and dust is gathered by a Browning dust collector. Compressed air is supplied by a Joy unit mounted on a special company-designed chassis.

PREPARATION FACILITIES are designed to process 300 tph of raw coal and provide a premium product with 2.50% ash and 0.72% sulfur.

As the first roof bolts are being installed in the right corner, the cutting crew prepares to sump at the right rib. The drill crew adds pans to the conveyor line while the cutting machine follows the bolting crew across the face.

Under average conditions it takes five days to complete a pair of rooms. Average output is between 21 and 22 tons per faceman and peak performance with the Piggybacks in good conditions and 36 in of coal is better than 40 tons per faceman.

When a pair of rooms is completed, the panlines are left in place. The self-propelled drives are trammed to new room sites and reset and the tail section and enough pans to start the new rooms are hauled to the new rooms by the company-designed three-wheel supply car and trailer. Equipment moves take 5 hr and are made on the third shift by six men from the regular face crew who stay over for the required time.

ENTRY DEVELOPMENT

In mine No. 32 main entries are developed with conventional equipment. Each section has a Joy 20-BU loader, two 8SC shuttle cars, Jeffrey 35L cutter on a T2 truck and a Chicago Pneumatic hand-held electric drill. Mains are developed with six headings on 50-ft centers and breakthroughs are spaced 70 ft apart. All headings are driven 20 ft wide except the second one from the right, which is 14 ft and serves as the haulway after top is brushed. Enough

rock is taken to provide 6 ft of clearance above the rail.

Shuttle cars discharge onto a 30-in belt conveyor which carries the coal to dropbottom mine cars. When the belt is extended 1,500 ft the drive is moved ahead and reset at a new car-loading station. Belt is added after each 200 ft of advance or on the weekend following an advance near that distance.

Entry crews include a loader operator and helper, two cutter operators, two drillers, timberman, boom man, repair man and foreman. Output ranges from 17 to 19 tons per faceman per shift.

As the face crew advances in coal on a two-shift basis rock also is taken in the track heading. Top rock is drilled with a chain-feed Sullivan L57 drifter mounted on a hydro-jib boom. Compressed air is provided by a WK 30 compressor. Five 12-ft holes are drilled in each round of rock. Shot rock is loaded on the third shift with a Joy 11-BU loader.

Room entries also are sometimes developed with off-track equipment. To provide room for the various pieces of equipment, five headings are driven on 50-ft centers with breakthroughs on the same centers. Entries are driven 1,500 to 2,000 ft deep and if rooms are driven with off-track equipment, five are advanced in a group. Rooms are 30 ft wide on 40-ft centers and are driven 380 ft from the belt heading. It takes 2 wk to complete a group of five rooms. Rooms are driven on alternate sides of the entry as mining is done on retreat. A 15-ft strip of solid coal is left between each panel of rooms.

A spare loader and cutting machine are kept in each section so that down time will be kept to a minimum in event of a breakdown.

SPECIAL UNITS FOR THIN COAL

Peabody has developed or modified several pieces of mining equipment to ease the mining problem in the thin coal. For example, to reduce to a minimum the laborious work of moving conveyor pans, chains or taking repair parts to the face, the company designed a three-wheeled supply car and trailer. The tractor and trailer, now made by Manson Machine Co., can haul five conveyor pans at a time and 30 to 40 pans can be recovered in a shift. It also comes in handy to haul belt conveyor pans and idlers when 200-ft belt extensions are made. Two or three men can distribute the necessary materials in 4 hr whereas it took the same men several shifts before the tractor and trailer were built.

Before the tractor and trailer were developed, the company used four-wheeled wagons mounted on rubber to haul supplies in the chain-conveyor sections. This unit was pushed from place to place and the work was hard and time consuming. In most instances it required more than one man to push a buggy load from place to place. With the electrically powered tractor and trailer, one man now can handle the day-to-day section supplying alone with much less effort and with greater safety. He frequently has spare time and helps hang curtains, rock dusts and so on.

Power is provided for the tractor by a 9J motor transmitting to a chain drive through a speed reducer. The tractor is 9 ft long, 4 ft wide and only 19 in high. It is equipped with 250 ft of trailing cable which permits the unit to travel a total of 500 ft in one heading.

A second special low-coal unit developed at Peabody is a rubber-mounted self-propelled chassis for section air compressors. The company was plagued with damage caused by the compressor bumping into the roof or scraping the bottom as it was trammed on a cutting-machine truck in the rolling seam. The overall height of the compressor in the cutting-machine truck was only slightly less than the seam and some part of the unit would strike the roof or floor. As a result, there was frequent damage to intercooler, fittings or crankcase.

To reduce the overall height and thereby eliminate bumping and scraping as well as provide greater flexibility, the company designed the rubber-mounted chassis. The compressor is mounted in the middle of the chassis and four hydraulic jacks are installed on the outside of the frame to provide 5 in of vertical adjustment. Overall height can be reduced to 25½ in for moving in thin coal. Jacks, made from shuttle-car elevating-boom jacks, work in pairs. A hand-powered hydraulic pump is used to operate the jacks.

The chassis can be adjusted to have 5 in of road clearance or it can be lowered to the floor to provide the minimum overall height. Either end may be raised or lowered independently as the compressor passes through swags or over hills.

A 5-hp 9J electric motor operating through a 44:1 speed reducer powers the unit. Power is transmitted to the dual driving wheels by a chain and sprocket. Tires are 5:80x8 and dual wheels are used on the drive end.

The company reports that only routine servicing and minor repairs are needed on the compressor since the new self-propelled chassis has been in use.

Peabody has 1,500 ft of rope belt conveyor installed experimentally in No. 32 mine. The rope unit is only 13½ in high and provides an additional 5 in of clearance for men being hauled to the face. Another benefit is that there are fewer parts to handle and they are lighter. Only four men were needed to make each 200-ft extension as compared to eight men needed for a conventional unit. Rope supports were anchored to the floor with 30-in roof bolts and ¾-in turnbuckles were used to apply the proper tension to each rope.

PREPARING THE COAL

Coal is hauled to the preparation plant in 3-ton Sanford-Day and 5-ton ACF mine cars and discharged into a 425-ton storage bin at the seam elevation.

From there it flows downhill by button conveyor to the plant. Raw coal first passes over an Allis-Chalmers vibrator and is separated into plus 5-in and 5x0 fractions. The plus 5-in discharges to a loading boom which conveys it to railroad cars. Any impurities in the lump coal are removed by hand picking as the coal moves along the boom.

The 5x0 is conveyed to a pair of vibrators where the ¼x0 is screened out and either loaded directly into railroad cars or sent to a 100-ton steel storage bin for loading later. The 5x¼ is flumed to a Simon-Carves wash box.

Clean 5x¼ passes over vibrating dewatering screens where it is separated into 5x28M and 28Mx0 sizes. The 28Mx0, produced by degradation, is pumped to a settling tank and thence to a settling pond. The 5x28M is conveyed to the sizing screen and split into 5x3, 3x2 and 2x28M fractions. Or it may be delivered to a crusher and reduced to 1 in top size and then delivered to the rescreen vibrators for sizing into 1x½, ½x¼ and ¼x0. Each of the sizes is delivered to a separate storage bin. Coal is fed from the storage bins onto a belt conveyor by Jeffrey-Traylor feeders and may be loaded separately or mixed on the belt and loaded as a blend.

Any of the various sizes can be treated with hot oil supplied by a Viking system. The company now treats 5x3, 3x2, 1x¼ and ½x¼ sizes. Peabody's coal from Harlan County is sold under the trade name of Great Heart and in the washed sizes customers are assured premium coal with only 2.5% ash and 0.72% sulfur.

50 Largest Bituminous Coal Mines in the U. S. Rated According to Tonnage Produced in 1956

	COMPANY	NAME OF MINE	STATE	PRODUCTION 1956	1955	1945
1.	Peabody Coal Co.	*Peabody No. 10	Ill.	3,427,396	3,628,121	New 1952
2.	Mathies Coal Co.	Mathies	Pa.	3,012,667	2,482,058	59,992 [1]
3.	Hanna Coal Co.	Georgetown No. 12 (s)	Ohio	2,922,579	2,412,496	1,942,055
4.	Pocahontas Fuel Co., Inc.	*Itmann	W. Va.	2,832,540	2,702,564	New 1949
5.	Freeman Coal Mining Co.	*Orient No. 3	Ill.	2,654,179	1,582,907	New 1950
6.	Clinchfield Coal Corp.	*Moss (ps)	Va.	2,470,231	2,501,339	New 1947
7.	Peabody Coal Co.	*Peabody No. 17	Ill.	2,297,714	2,534,815	New 1949
8.	U. S. Steel Corp.	*Lynch No. 32 (c)	Ky. E.	2,119,762	1,914,892	New 1951
9.	Pocahontas Fuel Co. Inc.	Bishop	W. Va.	2,105,822	1,968,089	1,243,800
10.	Jones & Laughlin Steel Corp.	Vesta No. 5 (c)	Pa.	2,087,361	2,473,502	1,243,827
11.	Eastern Gas & Fuel Assoc.	Kopperston 1 & 2	W. Va.	2,035,517	2,085,992	1,173,915
12.	Eastern Gas & Fuel Assoc.	Federal No. 1	W. Va.	2,019,333	1,566,766	1,692,509
13.	U. S. Steel Corp.	Gary No. 2 (c)	W. Va.	2,009,524	1,952,486	1,711,444
14.	U. S. Steel Corp.	*Robena 2 (c)	Pa.	1,993,334	4,914,741 [9]	New 1946
15.	Olga Coal Co.	Olga	W. Va.	1,914,469	1,926,760	1,356,772 [8]
16.	Bethlehem Mines Corp.	*Idamay No. 44 (c)	W. Va.	1,907,020	2,088,485	New 1946
17.	Semet-Solvay Div., Allied Chemical & Dye Corp.	Harewood (c)	W. Va.	1,829,757	1,695,143	1,329,208
18.	Jones & Laughlin Steel Corp.	Vesta No. 4 (c)	Pa.	1,773,864	2,030,976	1,423,574
19.	Island Creek Coal Co.	No. 7	W. Va.	1,746,781	1,623,005	1,410,078
20.	Old Ben Coal Corp.	No. 9	Ill.	1,745,955	1,625,626	162,006 [4]
21.	U. S. Steel Corp.	*Robena 3 (c)	Pa.	1,728,519	..... [9]	New 1946
22.	Emerald Coal & Coke Co.	Emerald	Pa.	1,713,345	1,557,874	272,677
23.	Ken Coal Co.	*Ken (s)	Ky. W.	1,713,132	1,196,531	New 1948
24.	Christopher Coal Co.	Arkwright No. 1	W. Va.	1,711,362	1,651,799	547,550 [3]
25.	Christopher Coal Co.	Osage No. 3	W. Va.	1,709,071	1,560,266	996,949
26.	Freeman Coal Mining Corp.	*Crown	Ill.	1,678,543	1,723,975	New 1951
27.	Duquesne Light Co.	Warwick (c)	Pa.	1,628,671	1,397,121	861,930
28.	Consolidation Coal Co.	*Williams	W. Va.	1,625,331	1,246,651	New 1947
29.	Hanna Coal Co.	*Glen Castle 6	Ohio	1,624,785	1,212,035	New 1954
30.	Christopher Coal Co.	Pursglove No. 15	W. Va.	1,583,937	1,441,177	465,770
31.	Rochester & Pittsburgh Coal Co.	Ernest No. 3	Pa.	1,567,426	1,552,580	1,200,003
32.	Powhatan Mining Co.	Powhatan No. 1	Ohio	1,566,059	1,467,610	847,934
33.	Truax-Traer Coal Co.	Red Ember (s)	Ill.	1,557,058	1,510,991	1,349,521
34.	Powhatan Mining Co.	No. 3	Ohio	1,549,783	1,410,536	942,142 [7]
35.	Pocahontas Fuel Co.	Amonate	W. Va.	1,529,027	1,324,167	1,242,924
36.	Alabama Power Co.	Gorgas (c)	Ala.	1,507,324	1,318,584	274,512
37.	Homestead Coal Co.	Homestead (s)	Ky. W.	1,468,129	2,307,559	456,337 [3]
38.	Hanna Coal Co.	Bradford No. 1 (s)	Ohio	1,445,536	1,579,492	343,801 [6]
39.	West Kentucky Coal Co.	*Pleasant View	Ky. W.	1,438,938	1,305,283	New 1949
40.	Powellton Coal Co.	Jane Ann	W. Va.	1,433,737	1,487,985	610,000
41.	Tennessee Coal & Iron Div. U. S. Steel Corp.	*Concord (c)	Ala.	1,427,819	1,626,971	New 1947
42.	West Kentucky Coal Co.	*East Diamond	Ky. W.	1,420,079	1,238,484	25,580 [4]
43.	Island Creek Coal Co.	No. 22	W. Va.	1,417,576	1,356,980	813,646
44.	Inland Steel Co.	Price (c)	Ky. E.	1,416,599	1,529,057	1,430,000 [6]
45.	Youghiogheny & Ohio Coal Co.	Nelms	Ohio	1,413,917	1,275,168	901,202
46.	United Electric Coal Co.	Fidelity 11 (s)	Ill.	1,411,546	1,123,998	1,545,552
47.	Central Ohio Coal Co.	*Muskingum (c) (s)	Ohio	1,410,493	1,241,274	New 1952
48.	Bethlehem Mines Corp.	No. 41 (c)	W. Va.	1,404,259	1,399,647	1,802,669
49.	Consolidation Coal Co.	No. 32	W. Va.	1,384,014	1,451,214	1,191,348
50.	Eastern Gas & Fuel Assoc.	Keystone	W. Va.	1,375,472	1,460,337	1,218,086
	TOTAL OUTPUT, 50 Mines			90,767,292	87,666,109	34,089,313
	U. S. TOTAL, Bituminous and Lignite			500,000,000	470,000,000	577,617,327

SYMBOLS: (c) Captive mines. (s) Strip mines. (ps) Part strip. * New mines since 1945. [1] Pittsburgh Coal Co., mine under development. [2] Deep mine — now exhausted. [3] Consolidation Coal Co. [4] Mine under development, opened in 1945. [5] Bradford Collieries Corp. [6] Wheelwright mine, now part of Price. [7] Rail and River Coal Co. [8] Carter Coal Co., operated as 2 mines. [9] Robena 1, 2 and 3 operated as one mine prior to 1956.

9-YD DRAGLINE with 165-ft boom strips lower part of shale overburden without aid of explosives. Cuts usually are made 150 ft wide, and sometimes reach 200 ft. Coal is swept with power broom before 2½-yd shovel loads 12-ton trucks.

BULLDOZERS and second 2½-yd shovel cut down the upper 30 to 40 ft of overburden. The overburden is pushed into the old pit until bank and spoil are level with each other. Rooter on dozer blade loosens shale for easier digging.

ACCESS ROAD cut into solid shale at edge of highwall provides solid footing for service trucks in wet weather.

Stripping Without Shooting

How McNutt Coal Co. takes up to 60 to 80 ft of shale without shooting to recover 42 in of coal. Bulldozers supplement a dragline and shovels for stripping and backfilling.

IT TAKES INGENUITY, planning and flexibility in methods to strip 60 to 80 ft of shale and successfully mine a 42-in seam of coal. And when the material is moved from its original position without blasting it can be termed unusual. That job is being done today at the H. N. McNutt Coal Co., Rimersburg, Pa., with three bulldozers, a 9-yd dragline and a 2½-yd shovel.

In August, 1954, H. N. McNutt took over the present property after it had been idle for several years. The "cream" of the coal had been removed to a 40-ft highwall and most of the remaining reserves were under 60 to 80 ft of cover. But the present owner, a veteran strip operator with experience in the rugged West Virginia mountains, saw possibilities in the property and bought it and the equipment used by the previous owner.

The original equipment included a Bucyrus Monighan 9-yd diesel dragline with a 165-ft boom, two Caterpillar D8 bulldozers and a Lorain 80 diesel shovel. Using this equipment, the company tackled the mining job. The two bulldozers were used for stripping and backfilling, the Lorain 80 for stripping and coal loading, and the Monighan for stripping only.

The company used this combination of equipment for the remainder of 1954 but embarked on an improvement program for the following year. A Lorain 85 diesel shovel with an Esco 2½-cu yd dipper and Caterpillar D8 and D9 bulldozers were added to boost stripping efficiency and increase the overall flexibility of the operation. In 1956 another D9 bulldozer and a second Lorain 85 were added to replace a D8 and the Lorain 80 shovel.

UNCOVERING THE COAL

The McNutt mine is in the Freeport seam which averages 42 in and has little impurity in it. However, there is

TRUCK DESTINATION is 175-ton steel bin on hillside above preparation plant. Five trucks carry total of 1,800 tons per shift to plant.

FOUR-TRACK TIPPLE permits simultaneous loading of four different sizes which may be treated with hot oil.

UTILITY TRUCK hauls diesel fuel to pit in trailer. Welding equipment and small parts for repair and maintenance of equipment units are hauled in truck.

OWNER H. N. McNUTT, a veteran strip miner, coordinates activities.

OFFICE TEAM includes T. H. Price, office manager, and D. E. Wolfe, clerk.

a 12-in layer of bony on top of the seam which must be removed before the coal is loaded.

The overburden includes 10 to 12 ft of gray shale over the bony, then thin-bedded brown shale that extends to the 7-ft layer of soil at the surface. The thin-bedded shale is soft enough for the dozers, shovels and dragline to dig without it being broken by explosives. Since explosives are not used the company makes a sizeable savings.

The three bulldozers and one Lorain 85 cut down the upper part of the overburden, which is pushed into the old cut. They move an average of 30 ft of material and sometimes cut down as much as 40 ft of cover. When the bank and the material in the pit are level, the dragline takes over and moves the remaining cover to expose the coal.

One bulldozer blade is fitted with a rooter that is used to loosen the harder shale and thus make it possible for the other machines to push more material in a given time.

Cuts usually are made 150 ft wide and sometimes have been 200 ft. The present pit is 2,000 ft long and in places the cover is 95 to 100 ft thick. The company plans to recover all the coal in the present lease even though part of it is under nearly 100 ft of cover.

The dragline and bulldozers work two full shifts, 6 days per week and the rock shovel works one full shift and one part shift.

One shovel operator spends part of the second shift on each of the Lorains. For example, it takes about 5 hr to remove bony from enough coal for loading on the following day shift. When this cleaning job is completed, the operator moves to the rock shovel for the remainder of the shift. The proportion of the shift time spent on each shovel can be changed to meet day to day conditions.

The coal-loading shovel also is used on the second shift for another important job along the edge of the highwall, straightening it to as nearly vertical position as possible. This is done so that spoil from the next cut will fall freely into the pit and less pushing by the dozers will be required.

LOADING AND HAULING

The top of the coal is thoroughly cleaned in a two-step process before it is loaded. First, a Galion 102 motor grader scrapes the coarser impurities off the top of the seam. Then an International power sweeper removes the remaining material.

The Lorain 85 coal shovel loads into a fleet of Ford F800's. Five of the units are used regularly for the hauling job and a sixth is maintained as a spare. Each of the 12-ton trucks hauls an average of 350 tons per shift to the preparation plant. Trucks travel 2½ mi to the plant over private and public roads. The final leg of the route, which passes through a section of Rimersburg, was resurfaced with black top in 1956 by the company to eliminate dusty conditions in the vicinity of homes.

PREPARATION

Trucks discharge into a 175-ton steel bin located on the hillside above the preparation plant. From there the coal feeds into a primary crusher and is reduced to 8 in top size. The crusher product drops onto a belt conveyor that carries it to a combination picking and sizing screen. Two men remove impurities from the 8x¾ and the ¾x0 passes to an Allis Chalmers Ripl-Flow vibrator for further sizing into ¾x⅝ and ⅝x0. The ¾x⅝ flows to the pea bin and the ⅝x0 goes directly to railroad cars.

When the 8x¾ leaves the picking table it passes to an adjustable secondary crusher where it can be reduced to various sizes down to 1¼ in. Normal setting is 2 in. The crushed coal flows to a shaking screen and is separated into four products. Sizes include ¾ or ⅝x0 slack, 1½ or 1¼x⅝, 1½ or 1¼x¾, 2x1¼ or 1½ and various egg sizes between 2 and 8 in. Egg coal is loaded by boom to prevent breakage.

The plant also has a Viking hot-oil spraying system for treating all sizes with 90-viscosity Quaker State oil. Oil is sprayed on the coal as it approaches the end of the loading chutes. An average of 3 qt per ton of coal is used.

Brown-Fayro hydraulic car retarders control the railroad cars at the plant. One man controls all loading on the four tracks from a central point. Other plant personnel include two handpickers and two car droppers.

How You Can Keep Key Men

By ERNEST W. FAIR, Boulder, Colo.

REPLACING ANY MEMBER of a coal-company staff is never easy. The average employee can be replaced without any measurable loss of production, as a rule, but replacement of a key man is a different matter. It may take a lot of time and effort, and chances are you may be forced to make replacements a number of times before obtaining an individual as good as the one who left. It is obvious, therefore, that it is far better to keep key men than to have to replace them. This requires planning and foresight.

Many executives have worked hard at accomplishing this end. Their methods are worth consideration by every reader of these pages. Here are 10 guides:

1 Key men are different—In time, management develops definite techniques in handling employees as a group. These techniques result from experience and are shaped and reshaped until almost perfect. However, applying them to key personnel is often a mistake. These people usually have more intelligence, are more ambitious, have wider interests and react differently to different situations, and they must be handled differently.

2 They should have some measure of authority—There is nothing, other than wages, that will better hold a key man to a given job than having authority to match supervisory responsibilities. This is his first step upward in his ambitions within the firm. He will think a good deal before changing jobs when he must forfeit such standing with the firm for which he now works.

3 Opportunities must be equal to hold key men—These individuals have ambition (that's why they are in the jobs they hold) and are looking for opportunity for advancement. Time and again we have talked with such men in many lines of industry. Invariably when the subject of possible job shift to some other firm comes up they began asking questions about the opportunities in the other firm. Many executives make the unfortunate mistake of failing to keep such key men aware of the opportunities toward which they can work.

4 Net income positions should not be too far from those offered by competing firms—Many surveys show that given companies are holding key personnel despite offers of better salaries elsewhere, but the differential is generally slight and there are compensating advantages to the present job. Where such differences are great, however, this is the major cause of changes by key personnel from one firm to another in almost every industry, the coal business included.

5 Extra effort should be recognized—This is always of paramount importance in holding a key man on his job. We have usually placed these men in key jobs because they do possess such initiative. However, when they put out this extra effort beyond that required to do their jobs and no recognition is forthcoming they develop the "I'm not appreciated here" frame of mind. That means they are ready to jump to another company offering them equal opportunity where they believe such recognition is forthcoming.

6 Desirable working and living conditions are important—One of the most frequently mentioned factors in employment advertising is that of living advantages in an area or working conditions within an organization seeking such employees. Experience has shown these firms that this is one of the best possible "baits" to use in convincing such desirable employees to change jobs.

Pleasant working conditions always help breed job contentment. Their absence—when competing firms are offering them—is something such an individual notices in even greater detail than actually exists. A periodic survey of employees to discover conditions which may not be satisfactory has been adopted as standard policy by many companies.

It is often difficult to do anything about living conditions in one's community but their importance in holding key men brings up the necessity of company executives taking an active part in promoting good conditions within the community.

7 Make certain the man is working at a job he likes—Keeping a constant check on the interests of such individuals, what they are studying or working at in their spare time and interests about which they have talked are keys to their ambitions. Where a key employee in a given spot is working toward such an ambition in another kind of job, and we want to hold onto that individual, it is wise to give him a similar opportunity within our own organization, if possible.

Not every good employee is satisfied with what he is doing today, no matter how good the job may seem to managament. It is foolish to lose him when we have an opportunity he desires within the organization.

8 Bad supervision can lose key employees—While we are checking such employees from time to time it also pays to survey supervisors and foremen as well. Where the latter have developed bad habits or methods of handling the men they can be a major cause of loss of key personnel in any coal company.

This is one of those "all other things being equal" conditions where such key personnel will not only snap at job opportunities elsewhere but actually go looking for them. No one likes to work under any individual who makes the job miserable no matter what the pay.

9 Unpleasantness at home can hurt—This should never be overlooked in surveying conditions which may lead to loss of key personnel. Often this is a situation where the wife of the employee dislikes the employer, the company or the executive involved. In most cases such dislike is based on misunderstanding.

For that very reason many firms find today that it pays to sell the company as a desirable firm for which to work to the wife as well as her husband. Small house organs offer an excellent medium for doing this and can be produced inexpensively. Company parties, dances and picnics are used for this purpose by many firms.

10 Instilling pride in the employee's work, in what he does and in the firm itself are important—we spend a lot of money selling our firm to the public and too often neglect selling it to employees. Pride in job and company are essential to job satisfaction, and particularly so with key men.

It takes powerful persuading to get a key individual to change jobs when he is not only happy in his present job but also possesses a great deal of pride in being an employee of the firm. Usually it is so difficult that it seldom succeeds.

Continuous Mining Experience In Western Pennsylvania

A regional report on . . .

Mining methods	**Performance**
Applications	**Productivity**
Costs	**Projections**

By JAMES T. JONES, Assistant Superintendent
Mather Collieries, Pickands Mather & Co., Mather, Pa.

THE LEE-NORSE MINER was introduced in western Pennsylvania in the latter part of 1951 as an experimental machine. It was mounted on rubber tires, it sumped into the coal on traction, and it was considered a full entry machine, cutting a face 12 ft wide. In early 1952 the machine was rebuilt. Crawlers replaced the rubber tires and a sumping-head mounted on slides became a new feature. Between then and 1954, when the machine was purchased by the company using it, it was changed from a full-entry machine to a machine cutting a face 8½ ft wide. A stabilizing jack was added to the back of the machine, greatly reducing the shock imparted by the cutting action.

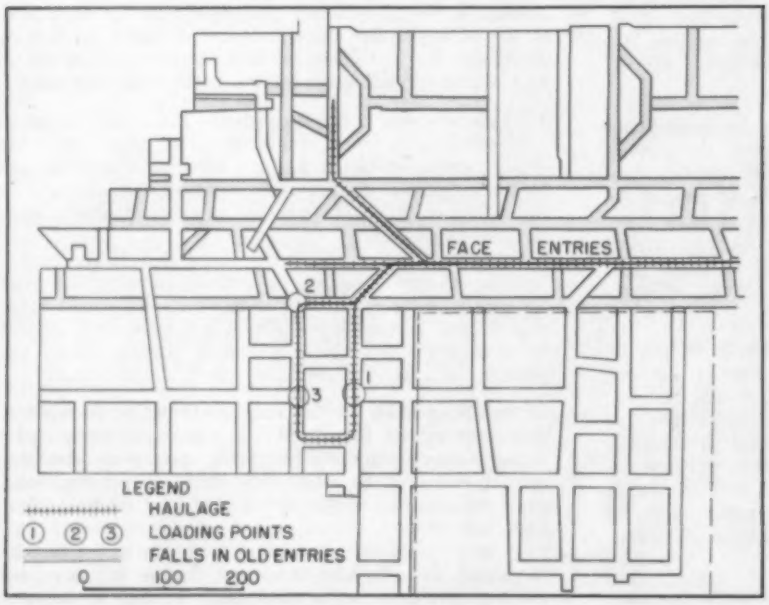


FIG. 1—DEVELOPMENT and retreat work in area enclosed by dashed line was done by continuous-mining machine.

At present, two differently designed machines are being built but both contain the basic principle of the original machine. The main difference is that one has a sumping head and the other has a rigid head which makes it necessary that it be sumped in on the crawlers. It is the opinion of some operators that the machine with the sumping head is advantageous where bottom conditions make sumping on the cats impractical. Other operators think that the rigid head is more advantageous because of the maintenance on the sumping head.

MACHINE CHARACTERISTICS

Other characteristics of the machine are as follows:

1. It provides a clean-up comparable to that of a conventional type loading machine.

2. It has fast tramming ability. Time studies indicate that in moving from one working place to another, including the time consumed in handling cables and other miscellaneous delays, it can be moved at an average rate of 40 fpm.

3. It is powered by two 40-hp motors on the cutter head, one 40-hp motor on the hydraulic pump and two 10-hp motors on the conveyor.

4. It requires an average of 240 amp when loading on a 250-v electrical system, but instantaneous peaks of 800 amp have been recorded.

5. After bolting or timbering a face in preparation for mining, the miner can make cuts up to 16 ft deep

For a digest of this and other features in this issue of *Coal Age*, see the expanded contents section, pp 5, 7 and 11.

Presented by the author at the December, 1956, meeting of the Coal Mining Institute of America, Pittsburgh, Pa.

without exposing the operator to unsupported roof.

6. Coal can be cut and stored on the loading head while the shuttle car is traveling from the miner to the loading point. This eliminates the need of surge equipment behind the miner.

7. Although the machine is rated at 3 tpm, observations have been made where it has loaded as much as 7 tpm when the machine was extracting a fender under favorable conditions.

8. In many of the installations in western Pennsylvania the machine is used to cut the drawslate over the Pittsburgh seam, which is an indication of its ruggedness.

9. Dust control is provided by 14 sprays arranged at advantageous points around the head of the machine. The spray water is provided by two hydraulic water pumps mounted on the miner which furnish a total of 16 gpm to the sprays at a pressure of 200 psi. To make the dust control system fully effective an adequate supply of water should be furnished on the section at a minimum of 80 psi.

10. Ease of maintenance of machine has been achieved by placing removable parts such as motors, bearings, gears and so on where they are easily accessible.

MINING METHODS

In making the survey for this paper it soon became apparent that the operation of the miner in the mines surveyed has been to a large extent in areas having adverse mining conditions and none of the machines in operation are in sections previously projected for continuous mining. That this is a measure of the versatility and ruggedness of this machine as well as the ingenuity of the operators in adapting it to these areas can be shown by a study of some of the areas being operated.

Fig. 1 is an example of the type of section where the miners are working. In this area the miner was first used for development work and later transferred to rib extraction.

The development was in an area enclosed by the dotted line and was the beginning of a set of butt entries which have since been extended by conventional trackless equipment. Normally for conventional trackless mining this section would have been started by a construction crew and driven to the point where a sufficient number of working faces were available for the operation of conventional trackless equipment. Here advantage was taken of the miner's ability to maintain a good production in one or two working places by opening up the section from loading point No. 1, as shown, which was established along an existing haulage road. Two working places were maintained most of the time so that roof bolting could be done in one place simultaneous to the miner's operation in the other place. This area provided a good training ground for the operating crew.

When the development had been driven to the extent shown, the miner was transferred to the rib section along the old face entries. These entries had been driven 34 yr ago and most of them had caved as shown on

TABLE I—Performance Data of Mines Studied

	Average	Minimum	Maximum
Tons of raw coal per shift	190	155	240
No. of men on crew (includes foreman)	4.2	3.5	6.0
No. of tons of raw coal per man shift (includes foreman)	45	35	64
Percentage of down time due to mechanical and electrical delays (based on actual time at face)	10.0	8.2	12.0
Percentage reduction in face labor on section achieved through use of Lee-Norse miner compared to that of conventional track-mounted equipment	52.5	50.0	55.0
Percentage reduction in face labor on section achieved through use of Lee-Norse miner compared to that of conventional trackless equipment	33	25	41

Note: The miners are worked three shifts at all of the mines studied with the exception of one mine where the miner is worked two shifts. At this particular mine a skeleton crew of three workmen are employed on the third shift to rock dust, timber, clean falls, and so on. These men are not included in the tabulation.

TABLE II—Cost Data of Miners Studied

	Average	Minimum	Maximum
Bit cost per ton of raw coal	$.06	$.04	$.12
Maintenance cost of spare parts per ton of raw coal	.17	.11	.25
Labor cost of maintenance per ton of raw coal	.11	.09	.13

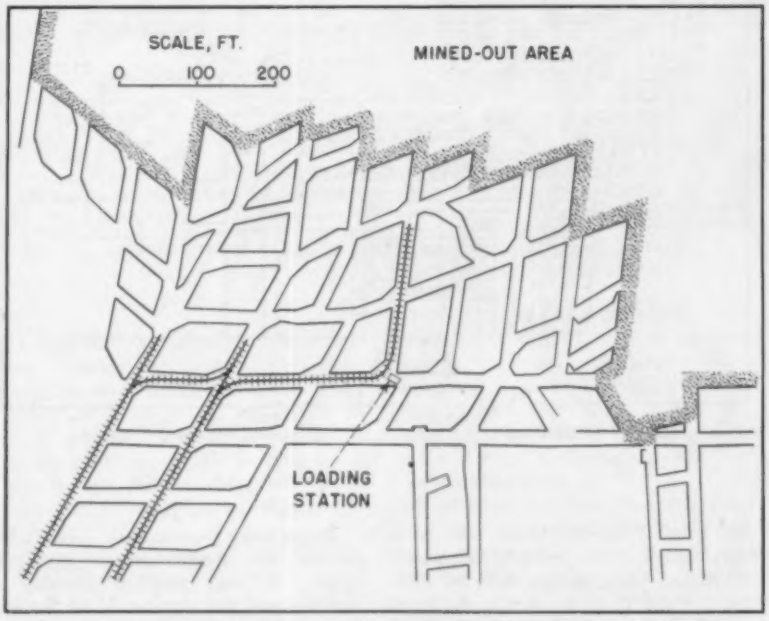


FIG. 2—HOW ROOMS are mined at angle of 60 deg with entries.

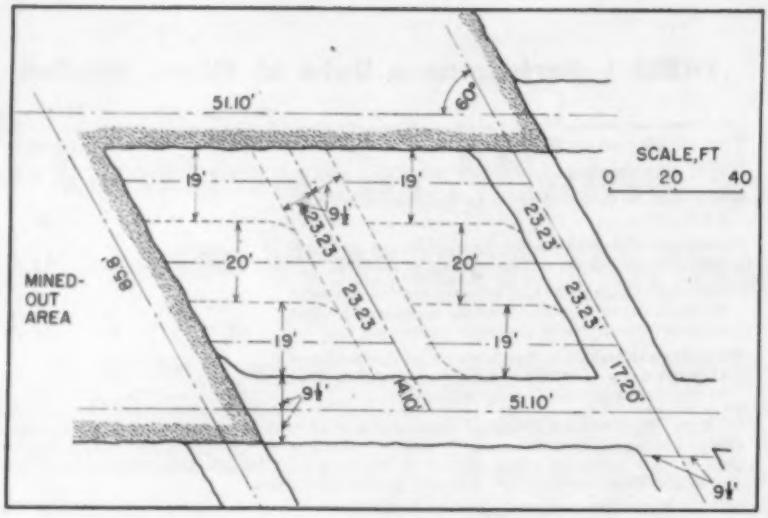


FIG. 3—PLAN for extracting a diamond-shaped block.

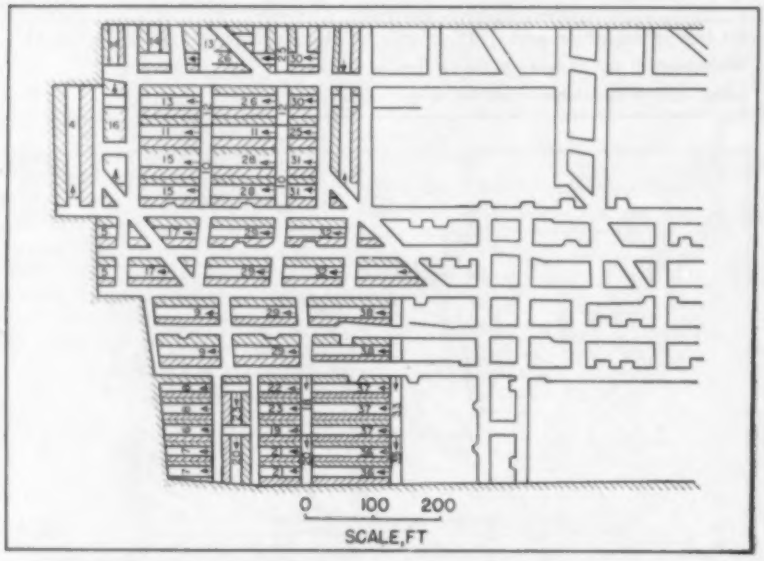


FIG. 4—SEQUENCE of double-split mining and fender extraction.

the print. Some of these falls were very high but the average fall was 8 ft. Blocks have been mined by driving gob splits and extracting the fenders. Subbing has been done where possible to eliminate cleaning. Where cleaning had to be done it has been done by the Lee-Norse miner and by the regular crew during the shift, decreasing the normal productivity of the machine. To maintain the distance the shuttle car traveled in going from the working place to the loading point at a maximum of 500 ft two loading points, at locations 2 and 3, have been established and the one closest to the place being mined is used.

In the foregoing example rooms and entries are shown driven at right angles to one another forming a squared or rectangular block to be later extracted. At another mine rooms are driven at an angle of 60 deg to the entries on centers of 115x85 ft. This system of mining was established for on-track conventional mechanical equipment and is being continued for continous mining equipment as shown on Fig. 2. Fig. 3 shows the method used for extracting the diamond shaped blocks shown in Fig. 2 with the Lee-Norse miner. It is accomplished by splitting the block on its shorter axis and removing the remainder of the block by driving 38 ft open ends varying from 19 to 20 ft wide.

EXTRACTING CHAIN PILLARS

Fig. 4 is a system being used at another mine which is quite interesting because of the departure from the orthodox method of extracting pillars. Here a set of main-entry chain pillars is being extracted between old gobs under approximately 400 ft of cover. Splits are numbered to indicate the sequence in which they are made and arrows indicate the direction in which they are driven. Where possible at least two 14-ft splits are made in the same block and cut alternately to provide at least two working places for the Lee-Norse miner. The splits are bolted by alternating the bolter men and the miner men from place to place. The split next to the gob is driven to form a 10-ft fender between it and the gob. The next split is driven to leave a 20-ft stump between it and the gob split. After driving the splits the fender along the gob split and half the stump to the right is removed by taking cuts with the miner to the left and right as indicated. Then the next gob fender and a 10-ft slab along the opposite side of the next split are removed by taking cuts to the left and right. The rib section as a whole is carried flat across the chain pillars between the old gobs.

The foregoing are examples of working sections typical of the miner sections operating in western Pennsylvania. At no location have the miners yet been operated in a large solid block of coal that could be projected in a manner most desirable for the operation. Consequently the performance and cost data shown in Tables I and II become all the more noteworthy because it is a record of the machine's performance under adverse mining conditions.

COSTS AND PERFORMANCE

To make this paper as informative as possible the data in the tables have been divided into average, maximum and minimum values. For example, under the heading showing the tons of raw coal per shift in Table I the average of all the mines included is 190 tons. The average tons of raw coal produced by the mine with the lowest production rate is 155 tons per shift and the average tons of raw coal produced by the mine with the highest production rate is 240 tons per shift. All of the figures in the tabulation have been computed on a raw coal basis.

While the tabulations on performance and cost are not complete,

enough data have been included to permit anyone interested in this type of miner to fit these figures into his own cost picture in trying to determine what his operating cost would be if he were to use them for mining coal at his particular mine.

TRANSPORTATION, ROOF SUPPORT

The method used to transport the coal away from the Lee-Norse miner is one of the most important features of this machine. Because of its ability to cut coal and store it on the loading head in conjunction with its ability to provide a good clean bottom no intermediate equipment is needed between the miner and the shuttle car transporting the coal to the loading point. In the mines included in this report one shuttle car is used with each miner with the exception of one mine where two shuttle cars are used.

Roof support varies from mine to mine. In the majority of cases the roof is being supported by roof bolts both in the solid places and in the gob splits. The exception is the mine previously described where the blocks are split and open-ended. Here cross-bars are set at maximum intervals of 8 ft. Most of the roof bolting is being done by stopers but at one mine it is being done by rotary equipment. Where either method is used the miner is moved to another working place while bolting is being done. Where timber is used the miner never leaves the working face.

The crews are small and the distance to be covered by the foreman on one unit is short so that in most cases the unit foreman divides his time with another unit.

MINING PROJECTIONS

In considering the mining projections that will be used in the future for mining with this machine it is reasonable to assume that many of them will soon be put to work in areas that have been developed exclusively for them. How this will affect their productivity is a matter for conjecture. Fig. 5 is a proposed plan for mining with a Lee-Norse miner. These entries are already driven and are now ready for rib extraction. The plan includes a regular stepped rib line along blocks driven on centers of 110x71 ft. The main feature of this plan is the short haulage distance (maximum, of 410 ft) that will be attained by moving the loading point every 110 ft as needed.

Fig. 6 is another proposed mining plan soon to be put into operation.

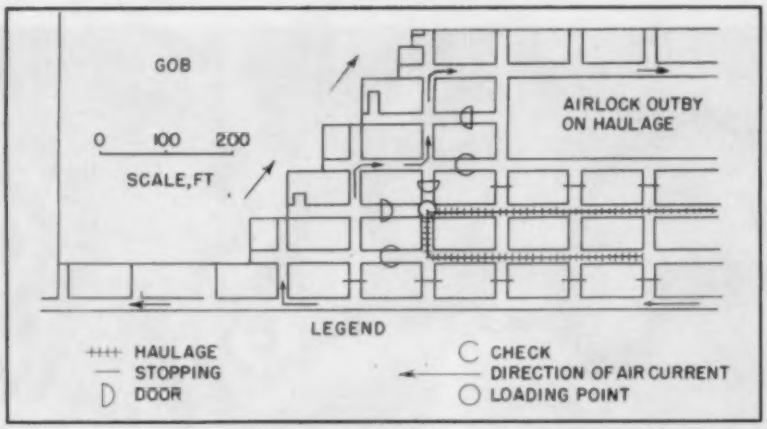


FIG. 5—PROPOSED PLAN of mining using a block system.

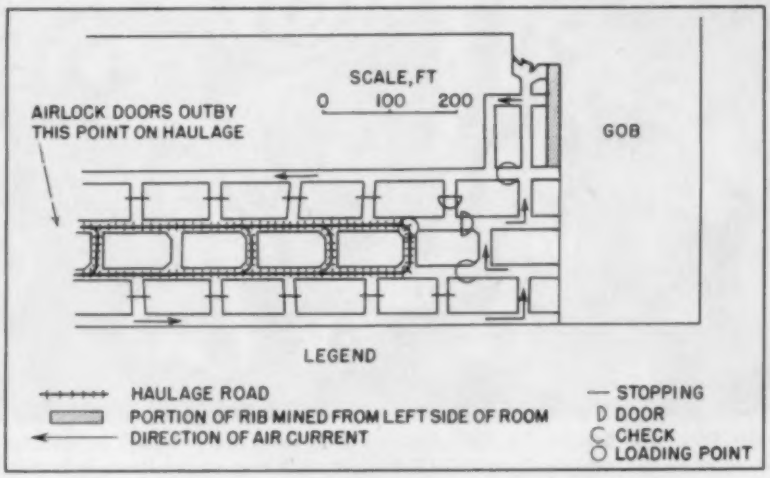


Fig. 6—PROPOSED PLAN of mining rooms driven on 57-ft centers.

The entries are already driven and are awaiting the arrival of another machine to start rib extraction. Here rooms 16 ft wide will be driven on 57 ft centers. Roof will be supported in the rooms by roof bolting. It is planned to extract the rib between the rooms in the following manner.

Step 1—A cut will be taken to the right of the room leaving a small stump on the corner for protection.

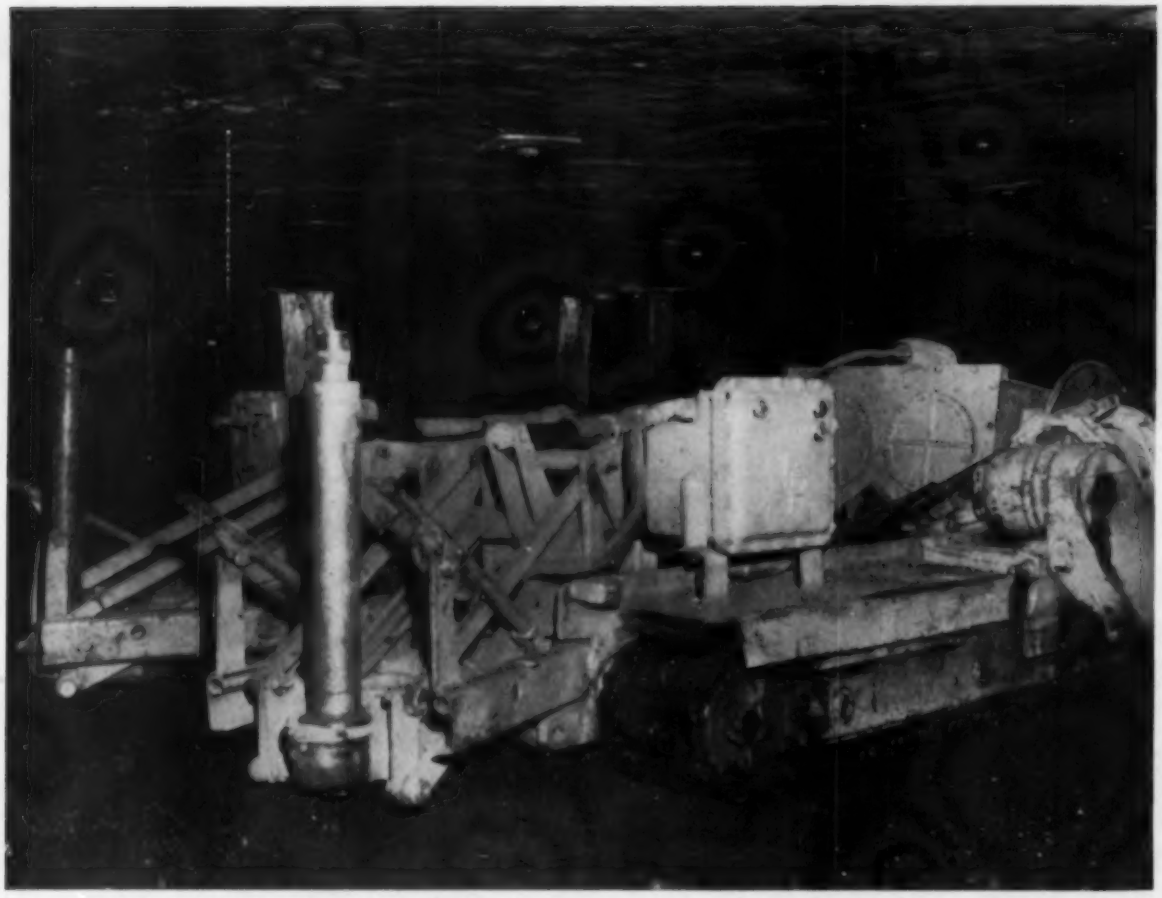
Step 2—The machine will swing to the left and take a cut out of the solid coal cutting through to the gob on the back of the cut and leaving another small block for protection. While the second cut is being made the first cut will be timbered.

Step 3—The machine will then take another cut to the right completing the lift.

Step 4—Protective cribs and breaker posts will then be set and the crew will be ready to take another lift in the same manner. This plan will require very close roof control but some experimentation has been done in preparing for it which indicates its workability and safety.

Ventilation on the miners is done in a conventional manner. Air is taken in on one end of a rib line and out the other or it is taken into the center of the rib line and split there going out both ends. A good sweep of air is needed at the machine in conjunction with water spray system to allay the coal dust.

The help received from many of the companies in western Pennsylvania using this miner in the Pittsburgh Seam is gratefully acknowledged. All the companies contacted have been helpful in providing data and maps relative to their operations, and their experience as well as our company's experience is included in this paper.



FOR BOLTING CLOSE TO THE FACE, drill frames are extended beyond the bed of the truck. Control boxes are mounted in the front of the crawler guards on each side of the truck to permit installing two bolts at the same time.

Increasing Bolting Efficiency

Mine made roof-bolting machine, consisting of two drills mounted on a machine truck, installs two bolts at the same time at one setting of the machine. Production is up 60-70 tons per shift for each section.

HIGHER PRODUCTION at the Omar Mining Co.'s No. 15 mine, Omar, W. Va., is credited to the increased efficiency of a revised roof-bolting machine. The machine consists of two Chicago Pneumatic RBD 30 roof-bolting drills mounted on a Joy T2 cat truck

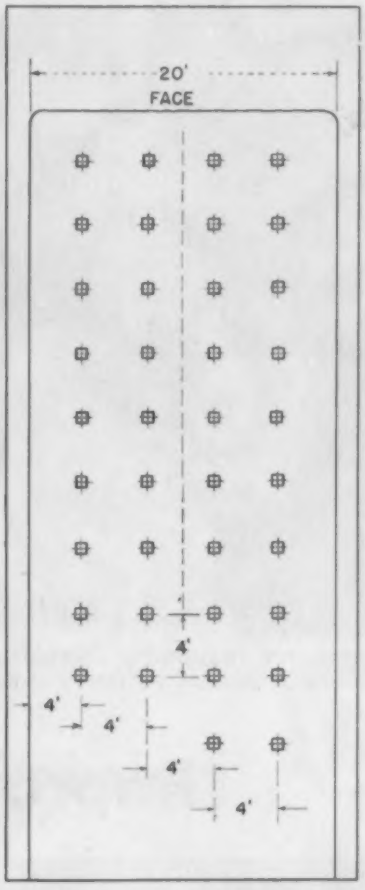
Roof-bolting the Cedar Grove seam at the No. 15 mine reduces roof falls which in turn increases tonnage and safety. The average height of the seam is 45 in. Roof conditions are fair. However, 6 to 12 in of draw slate is difficult to hold if the roof is not bolted. Bolts 30 in long with the expansion type shells are used. Section equipment consists of one Joy 14 BU loader, two 6 SC shuttle cars, one PL 11 elevator, one Jeffrey LC 29 cutting machine with a 9-ft bar and one roof-bolting drill. Until development of the new unit, this was a Chicago Pneumatic RBD 30 machine. A total of 12 men plus one foreman are used on the production section.

For a digest of this and other features in this issue of *Coal Age*, see the expanded contents section, pp 5, 7 and 11.

Efforts to increase tonnage included making time studies of operations. The results indicated that the roof-bolting equipment was unable to keep ahead of the cutting machine. This threw the preparation and loading cycle out of balance, resulting in lost tonnage.

Roof-bolting and timbering involved two men. One timbered while the

V-MOUNTING OF THE DRILLS shown in this front view, positions them 4 ft apart to conform with the roof-bolting standard. Note the height of the machine.



ROOF-BOLTING STANDARD calls for bolts 30 in long on 4-ft centers.

with Truck-Mounted Drills

other bolted top. The machine used to bolt top was mounted on three rubber tires with a hand brake on each of the two rear wheels. The drill had to be moved from place to place by one man pulling and the other pushing. The trailing cable had to be pulled, dragged or spooled up on the machine before moving it to the next place. There was little space on the machine to carry roof bolts and tools. Only one roof bolt could be installed at each setting of the drill. Setting the machine in position for bolting took up considerable time. The roof-bolting permit called for two rows of bolts, four bolts to each row on 4-ft centers. This required setting eight bolts after each cut was cleaned up.

The problem was to speed up the roof-bolting cycle while still using the same number of men with the same type of bolting machine. L. R. Fraley, assistant to the president, and W. Kitchen, chief electrician, solved this problem by combining a T2 truck and two RB D30 roof drills into one unit. The front loading pan was removed to permit mounting the drills in the front, extending over the end of the bed. This facilitates bolting close to the face. The T2 truck is equipped with an electric cable reel which eliminates the handling of the cable. There is also ample space to carry roof bolts and other parts needed in bolting top.

Alterations to the bolting machine included removing the wheels and relocating the control boxes. The wheels were taken off to keep the machines at a minimum height, as well as to permit mounting the drills permanently to the bed of the T2 truck. The control boxes were located at the front and on each side of the truck's crawler drive guards. The two drills were spaced 4 ft apart to comply with the bolting permit. This made it possible to install two bolts at the same time and at one setting.

The revised machine has eliminated handling cable and manual transferring of the drill from place to place. Two heads cut the number of settings in half, and the new design facilitates keeping roof-bolts and tools close at hand. The increased efficiency of the machine has paid off. An increase of approximately 60 to 70 tons per shift for each section has been attained. The company is now building more machines of this type and plans to place one on each section that requires roof-bolting.

INTENSIVE TRAINING of mine mechanics during working hours is Duquesne Light Co.'s answer to the problem of improving maintenance for today's mining. Master Mechanic Mike Minnick explains control functions to six-man class.

Improving Local Maintenance

The need:

Modern mines equipped with numerous complex units require the services of skillful electrician-mechanics.

The fulfillment:

Duquesne Light Co. decides the best way is training at the mine on company time for maintenance men.

ELECTRICIANS at left, guided through diagram by Instructor Cliff Sweeney, are locating a "bug" planted in a loading-machine control panel.

MANAGEMENT'S RECOGNITION of its own responsibility in achieving top-notch maintenance is behind a new training program for mine mechanics and electricians at Warwick mine, Duquesne Light Co., Greensboro, Pa. The company now is providing a definite course of instruction, on company time, for an initial group of 18 mechanics in three classes of six men each. Each of the three classes meets twice a week, from 8 A.M. to 11 A.M., in a specially equipped classroom near the surface shop. The course is designed to provide a minimum of 48 hr of instruction and

For a digest of this and other features in this issue of *Coal Age*, see the expanded contents section, pp 5, 7 and 11.

SMALL CLASSES, meeting in a clean, comfortable, well-equipped classroom, make rapid progress in developing logical maintenance techniques. Fast location of troubles and complete checking of repairs are goals of the training.

Through In-Company Training

practical exercises in electrical theory and troubleshooting. Before the program is completed 36 other mechanics at Warwick will have an apportunity to take the training.

Purpose of the training program is to provide means through which the men presently employed as section and shop mechanics can upgrade themselves to handle the problems of modern machine mining more efficiently. Warwick is equipped with two types of continuous-mining machines, loading machines, universal cutting machines, shuttle cars, robot locomotives, extensible belts, articulated conveyors and so on. Good preventive maintenance and the fastest-possible location and clearance of electrical troubles are absolute necessities.

MANAGEMENT'S STAKE

A. R. Hood, superintendent at Warwick, points out that no one can criticize the work of a mechanic if he is not equipped with the proper tools and the training he needs to adequately maintain today's mining machines. In Duquesne Light's philosophy, this places the maintenance problem right back in management's lap. As a result, a conference among maintenance and operating officials was called at the

OBJECTIVE TESTS make it possible to refine course content and detect gaps in instruction. The tests are not competitively graded.

Warwick office by J. E. Elkin, general superintendent of the company's coal mines, to discuss ways and means of improving maintenance. The training program, sponsored by Mineral Industries Extension Services of Pennsylvania State University, is an outgrowth of this and later conferences.

M. J. Minnick Jr., master mechanic, assisted by Associate Professor J. W. Hunt of Penn State, prepared an outline of the subject matter the course should include and a list of the training aids, supplies and classroom facilities that would be needed to provide profitable training. His recommendations were accepted, with the result that the paid training time and the physical setup of "Warwick Tech", as described later in this article, represent an impressive investment in target-centered training, reflecting the recognition by Duquesne Light's management of today's need for highly skilled maintenance men.

Mr. Minnick, who assumes direct responsibility for the training program, under general supervision of Prof. Hunt, has had 8 yr experience as an instructor in mining electrical applications in night vocational classes of Mineral Industries Extension Services. His new training effort at Warwick is designed to provide more intensive training in logical troubleshooting on actual mining units.

SCHOOL FACILITIES

The classroom provides a floor area 20x40 ft, which will accommodate mining machines that may be brought in from the mine or the surface shop. Rail has been laid up to the overhead door opening into the classroom and spare rails are at hand to be laid in the room as needed.

Furnishings include student desks, a demonstration bench and laboratory benches along two sides of the room. Fluorescent lighting and warm-air heaters have been installed to make the room comfortable. A mine-voltage circuit serves the laboratory benches to eliminate the problems that might arise in working with one voltage in the classroom and another in the mine.

Visual aids include ample blackboard space, large wiring diagrams of the various mining machines, a slide-film projector, a delineascope and a screen. Complete sets of instruments—voltmeters, ammeters and wattmeters—are kept in the classroom to reconcile the theory of Ohm's Law with the effects produced in lampbank experiments.

The men in training are not apprentices; they are presently employed as mechanics with varying terms of experience. However, it is agreed that the instruction begin with a review of the fundamentals of electricity, including the relationships in Ohm's Law, characteristics of series and parallel circuits and the proper use of meters and instruments. Basic principles of motor operation and the functions of relays and contactors are thoroughly treated, using actual machine components as instructional aids. For example, the classroom equipment includes a complete set of the parts which make up into a typical mine motor, and all types of relays, contactors, coils and mercury switches used on Warwick machines are kept in the room. Such equipment is on hand to permit questions to be fully cleared up as they arise.

The purpose of this instruction in the fundamentals is to draw together on common ground the six men in each class, who most likely have diverse aptitudes and experience. From this point, the emphasis is on circuitry troubleshooting.

PRACTICAL EXERCISES

Mr. Minnick assumed the role of instructor as the classes got underway and he now takes over as each new subject is introduced. Much of the actual instruction, however, is done by Cliff Sweeney, an experienced Warwick electrician who attended all of Mr. Minnick's night-school classes. Both men are proficient in fielding and handling cleanly the hot questions that come from class members, and observation of a class in session reveals that both instructors constantly back up their answers by referring to applicable blueprints and wiring diagrams. This is done in an effort to establish the wiring diagram as the final authority and indispensable guide in troubleshooting.

In the session visited by the writer, the class was engaged in practical exercises involving the control panel of a loading machine. This instruction, like many other practical exercises at the Warwick training center, is designed to achieve four goals, as follows:

1. Increase the aptitudes of the students in the proper use of a test lamp as a troubleshooting aid.

2. Increase their skill in tracing circuits in wiring diagrams.

3. Develop a logical technique in troubleshooting to a point where the mechanic is able to isolate quickly the source of trouble, thus minimizing the number of cover plates that must be removed or the amount of disassembly that must be done to correct the trouble.

4. Emphasize the need for a full test of all motions of a machine after a single repair has been made, since other defects may have been contributing to the trouble that was found initially.

In working toward these goals each member of the class was given an opportunity to locate and eliminate the "bugs" which had been planted in the control panel by the others in the class. In his search for the source of trouble the troubleshooter is constantly cautioned by the instructors to rely on indications from his test lamp and to trace his circuits on the print, for the simple reason that while the panel may be open in the classroom it will be almost totally enclosed within the machine in the mine. Therefore, opportunities for tracing leads on the machine are extremely limited. A major portion of class time is devoted to this method of finding trouble by manipulating machine controls, watching the test lamp and consulting the diagram.

TESTING PROGRESS

It is planned to extend this type of training to include work on shuttle cars, continuous miners and other machines now in use at Warwick. Periodically throughout the course the men are tested through the media of true-false and multiple-choice tests to gage their progress, to detect gaps in the instruction and to help in refining the course to better serve Warwick's local needs. No attempt is made to grade the men competitively.

Several concessions had to be made by the company and the other mechanics not yet in training. The company agrees to have the men attend the school two days a week for the specified hours and then to complete these shifts on their assigned jobs. This means that the men now enrolled must work steady dayshift during the instruction period. The other mechanics, who will enter training later, rotate on the second and third shifts to make this schedule possible.

Management is assured that maintenance will be improved through increased job knowledge and job interest among the maintenance men. Reductions in downtime, which will result from faster clearance of outages, are expected to return the investment in training within a reasonable time. In fact, numerous instances of improved maintenance performance already have been noted. And a valuable by-product of the training may be the discovery of unrealized leadership talent among the maintenance men.

Synchronous Motors . . . Application, Starting, Operation

Practically all constant-speed applications provide opportunities for synchronous motors. Power-factor corrective capacity is a major added benefit. Care in starting and stable excitation voltage are key operating points.

By L. H. HARRISON

Mining Engineer-Electrical, U. S. Bureau of Mines, Washington, D. C.

SYNCHRONOUS MOTORS for driving motor-generator sets, ventilating fans, compressors, pumps and certain other continuously operating equipment are common in many coal mines. Despite their widespread use, there is a lack of knowledge of their characteristics and performance. This paper presents some of the pertinent information from available literature on the subject, and also covers the practical application of such information to mining-industry installations.

The loss of time and money to mine management because of the incorrect application and starting of such motors is believed considerable. These losses may be caused by improper adaptation, improper starting or improper operation, as well as a combination of the three. A good working knowledge of such motors is helpful in maintaining safety.

FIELD OF APPLICATION

Synchronous motors in the coal mining industry generally have been confined to motor-generator sets, ventilating fans, air compressors and pumps. Such equipment usually is operated continuously. Also, the synchronous motor has the dual characteristic of being able to supply power for driving a load while at the same time providing power-factor correction for the supply system.

The proper application of synchronous motors is not, however, confined to these units alone. One large manufacturer[1] puts it this way. "It [the synchronous motor] is universally acknowledged to be the most efficient constant-speed drive in industry. At first, application of the synchronous motor was confined almost solely to air compressors and generators of various kinds which could be started without load. Today, synchronous motors are used successfully for a range of applications including practically every constant-speed drive to which they can be economically applied."

The synchronous motor differs from the induction motor primarily in the method of energizing the rotating field with DC. This is mainly responsible for the difference in the operating characteristics of the two motors.

SYNCHRONOUS DESIGN

The primary windings of the synchronous motor and the induction motor are exactly alike. The induction motor, however, has a secondary winding of the distributed type similar to the primary winding. The rotating field of the synchronous motor is provided with definite poles excited from a DC power source.

Excitation potentials usually employed on synchronous motor fields are 125 and 250 v. The lower voltage is desirable because of the difficulty of insulating the field windings for the higher voltage induced in the winding during the starting period. Synchronous motors are started by autotransformers on reduced voltage or across the line on full voltage. Such motors, with rated speeds of 1,200 rpm and below, usually have the coil ends braced to withstand the strains of full voltage starting.

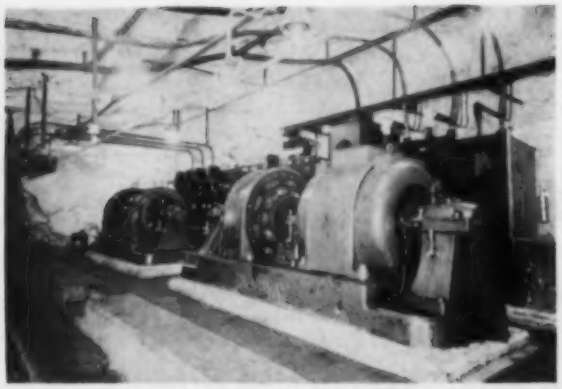
Nearly all synchronous motors start as induction motors. A squirrel-cage or amortisseur winding made up of copper bars and connecting end rings is installed on the rotor by driving the bars into holes provided in the pole tips. The resistance of the squirrel-cage winding is usually of such value as to provide maximum starting torque.

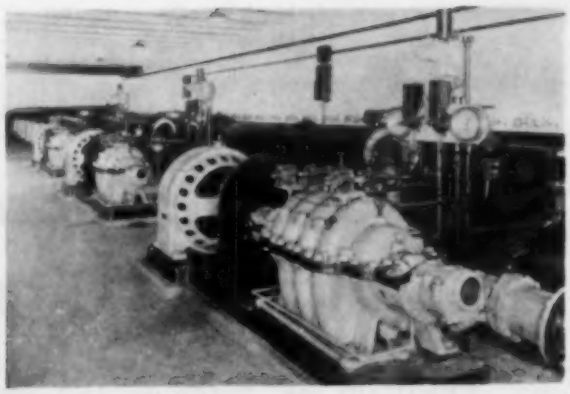
All motors with 125-v excitation should be started with field switch in the full open position, as closing the field through the discharge resistor has the effect of changing the resistance of the fields. Where the fields are excited from a 250-v source, however, it is usually desirable to start the motor with the switch in the discharge clips to avoid breaking down the insulation by high induced voltage.

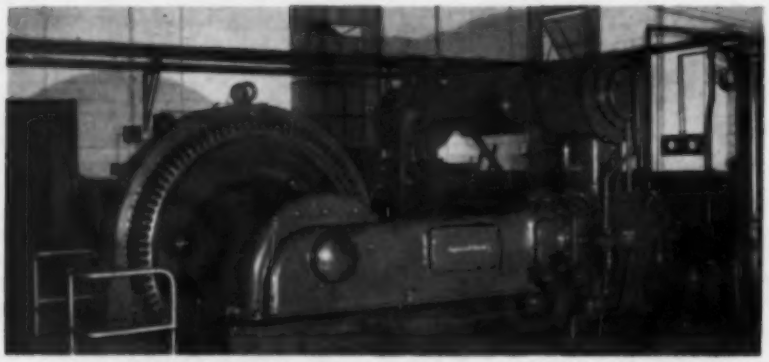
When voltage is applied to the stator or primary winding of a synchronous motor a rotating field is set up in the same way as it is in the stator of an induction motor. A voltage is induced in the squirrel-cage winding, current flows, and torque is produced by the reaction of the two windings in the same manner as in a squirrel-cage motor.

The magnetic flux from the primary also cuts the conductors of the field, and if the field circuit is closed current will flow. Where the synchronous motor fields are directly excited from the main DC generator, this induced current flowing in the closed field circuit may be sufficient to cause the rings under the brushes to burn. Synchronous motors thus directly excited should never be started with the field switch closed.

The starting current of a synchronous motor varies directly as the voltage applied at the motor terminals. With a compensator starter, the kva drawn from the line will equal the







TYPICAL CONSTANT-SPEED SYNCHRONOUS-MOTOR APPLICATIONS at coal mines include (top to bottom) m-g sets, pumps and air compressors.

kva taken by the motor. However, the current drawn from the line will vary as the voltage applied to the motor. Thus if a 50% voltage tap is used for starting, the applied voltage will be one-half the line voltage, and the line current will be one-half the load current. When a resistor or reactance starter is used, the current drawn from the line will be the same as the current taken by the motor.

Slow-speed synchronous motors are usually designed for full-voltage starting. The starting currents are low, and because of the large number of poles the coil ends are short and there is little stress in the motor windings during starting. The starting torque of the average low-speed synchronous motor also is comparatively low, and reduced voltage starting is not generally recommended. If it is necessary to use a reduced voltage starter with a low-speed synchronous motor, the torque requirements of the driven machine should be carefully checked. Usually the highest voltage tap of an auto transformer is an 80% tap, which reduces starting voltage to 64% of full value.

VOLTAGE MAINTENANCE

The "pull-in," or synchronizing torque, of a synchronous motor is comparatively small compared to that of an induction motor. It compares favorably providing the proper field is maintained. Unlike the induction motor, however, the synchronous motor will not continue to run once it has pulled out of step. Therefore, to insure against its pulling out it is essential that proper voltage be maintained.

The DC excitation voltage must also be stable to insure the stability of the synchronous motor under severe fluctuation of voltage due to line disturbances. Where the fields are excited from the main DC generator, considerable voltage variation may be experienced, and to provide stable operation the motor should be operated at or near its normal voltage rating.

The synchronous motor has a variable power factor characteristic: that is, the power factor can be varied over a considerable range on either side of unity. This is accomplished by varying the strength of the DC field. Therefore, since it can be operated at a leading power factor the synchronous motor is useful in correcting the lagging power factor usually resulting from the operation of induction apparatus.

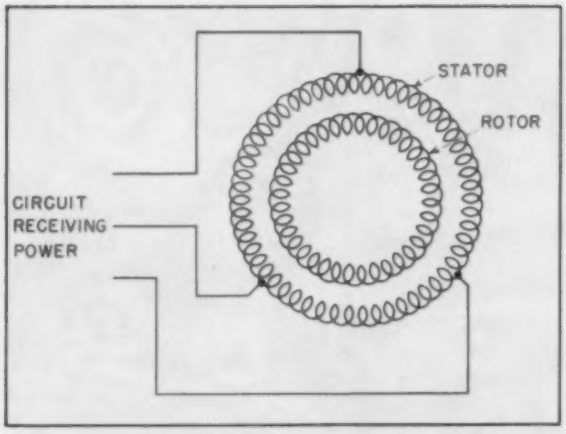
The mine electrician or superintendent often wants to know what field current should be used on a synchronous motor. If this information is not given on the nameplate of the machine the following procedure should be followed. First, with no load on the motor, determine the value of field current that corresponds to the minimum line current. Then, increase the field current approximately 35% and apply the load. With rated load on the motor, again find the value of field current that permits the least line current to flow. This will be the condition for unity power factor.

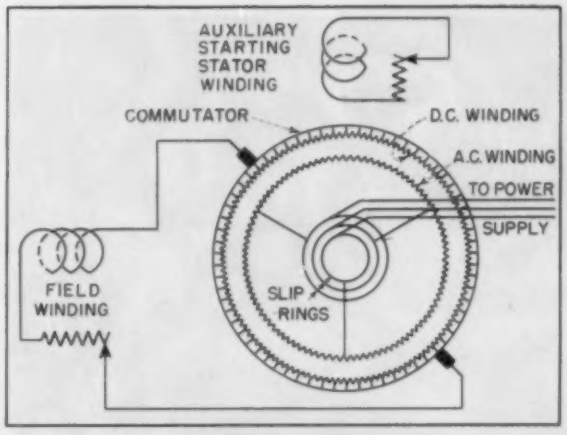
POWER FACTOR

If power-factor correction is desired it will be necessary to increase the value of the field current. The reason for this should be apparent if we consider for a moment the reactions taking place in the operating synchronous motor.

Any synchronous motor can be mechanically driven by an outside source of power and thus become an AC generator. When so utilized, a voltage is induced in the primary winding by the magnetic lines produced in the DC rotating field cutting across the conductors of the primary winding. This voltage will be 180 deg out of phase with line voltage at the same relative position of the rotor when operating as a motor. Similarly, when a synchronous motor is operating normally, it is generating a voltage which is in opposition, or counter, to the line voltage. Varying the DC voltage applied to the field changes the value of the countervoltage. This automatically changes the position of the rotor with relation to the primary, and this in turn changes the phase angle of the countervoltage in relation to the line voltage.

From the foregoing it will be seen that with the motor operating at unity power factor, the value of the countervoltage will be just sufficient to allow the minimum amount of current to flow to produce the necessary horsepower for driving the load. Any vari-





How Induction and Synchronous Motors Operate

POLYPHASE INDUCTION MOTORS. The squirrel-cage induction motors differ from other types of motors in that there are no electrical connections from the rotor winding to any source of electrical energy. The necessary voltage and current in the rotor circuit are produced by induction from the stator winding. Primarily, the motor operates at a low power factor and the lower its speed and load the lower its power factor. The commutator-brush-shifting induction motor provides a speed range of 3:1 and can be operated as a squirrel-cage motor by short circuiting the secondary winding.

SELF-EXCITED FYNN-WEICHSEL SYNCHRONOUS MOTOR. In starting, resistance is inserted in series with each of the stator windings with the AC rotor winding connected directly across the line. During starting the AC rotor winding acts as the primary of an induction motor and the two stator windings as the secondary of a wound-rotor induction motor. After the motor comes up to speed, the resistances are cut out. One of the stator windings is short circuited and the other is connected in series with the DC winding of the rotor. The synchronous motor will correct low power factor of a system.

ation in the field current will then change the value of the countervoltage as well as its phase angle with respect to the line voltage. Thus by increasing the field strength above that required for unity power factor, the voltage of the line is made to lag behind the current, or, as it is usually stated, the synchronous motor takes a leading current from the line.

Decreasing the field strength from that value required for unity power factor, on the other hand, causes the current to lag behind the line voltage. This condition will produce a lagging power factor and will tend to reduce still further the power factor of a system where it is already lagging because of the operation of induction motors on the line.

It should be obvious from what has been stated here that a synchronous motor should never be operated with a value of field current below that required for unity power factor.

OPERATING FACTORS

In operating synchronous motors the following facts regarding their performance characteristics should be kept in mind:

1. The armature current of a synchronous motor may be varied by changing the strength of field current.

2. There is one value of field current that will make the armature current a minimum, and any deviation from this value of field current will increase the armature current.

3. A field current below the normal value for a particular load will result in lagging armature currents, and a field current above the normal value will cause leading armature currents.

4. The power factor is less than unity when leading or lagging currents flow. The motor will have a lagging power factor with underexcited fields, and leading power factor with overexcited fields.

5. A synchronous motor should never be operated with underexcited fields. Operation under this condition defeats the purpose for which it was intended. Instead of improving line conditions by the introduction of leading current into the system it aggravates the condition, causing further loss in voltage.

6. Synchronous motors have poor starting characteristics compared to induction motors. Therefore, judgment and care should be exercised in starting them.

7. Because of the high voltage induced in synchronous motor fields wound for 250 v, the field switch must be closed to provide a circuit through the discharge resistance during the starting period.

8. Maximum starting torque is obtained with the field switch open. However, the "pull-in" torque is improved by closing the field switch on the discharge resistance.

9. A synchronous motor should not be operated any length of time on normal voltage without field excitation because of the enormous amount of magnetizing current taken from the line.

10. Excitation voltage should be stable. To insure this, 125-v exciters should not be operated below 90 v.

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TRANSMISSION

TIME AND COST SAVINGS begin with instanteous transmission of messages by Dispatcher William Fenniah from base station. Messages go out and replies are received via pole-mounted antenna at preparation plant.

How Two-Way Radio Promotes Strip Coordination

Better control of stripping operations by two-way radio contributes to lower cost by saving auto mileage, permitting better use of managerial time and speeding field repairs and maintenance.

By MAC and DON CHUTZ
Chutz Bros. Coal Co.,
Slippery Rock, Pa.

"HOW CAN TWO-WAY RADIO help our strip mine operations?" We asked each other this question about a year ago. An analysis of our problem provided a clear answer. With our staff of 52, we keep about 35,000 tons of coal rolling out of mine pits every month. This necessitates a high degree of coordination, in turn involving a major problem in communication.

We put Motorola "Private Line" two-way radio on the job to help us solve our coordination problems. The results were immediate and concrete. We now keep in direct contact with work progress in and around the pits. Any problems that develop are brought to the attention of the right person almost instantly.

ROAD TIME CUT

One example involves the travel of one of our field men. He clocked over 36,000 mi. a year coordinating production. On the basis of his present mileage, this total will be reduced to about 10,000 a year. This is a saving of over two-thirds in gas, oil and tires, to say nothing of time. Now routine problems are solved quickly, often by a return radio message. This helps to cut down unnecessary travel time.

Our eight two-way radio-equipped vehicles are in constant contact with our base station. A call from the field or from the base station refers any matter that needs attention to the proper person immediately. With definite assignments placed on a priority basis, each production unit is utilized fully, and crews are kept at maximum efficiency throughout the working day. Emergency work, too, is started faster and, in most cases, is completed sooner with two-way radio helping to call the signals.

Radio "costs," we estimate, run about $1.50 per day per unit. Figure auto cost at 8 to 10c a mile, and you can see that it doesn't take much in travel miles and time saved to return that amount. In fact, we find that our radio more than returns its

For a digest of this and other features in this issue of *Coal Age*, see the expanded contents section, pp. 5, 7 and 11.

RECEPTION

INSTANTANEOUS COMMUNICATION with office and mobile field units cuts driving time, ends patrolling of pits and speeds repairs. Mac Chutz (left) receives message in car. Don Chutz (right), head of maintenance, uses radio-equipped

operational and maintenance costs, and should pay for itself completely in a short time.

MAINTENANCE SPEEDED

Time is money to us in maintaining production and delivery schedules. When a shovel or dragline needs a new part, or, possibly, welding to strengthen a broken or weakening member, shutdown time is now often measured in minutes. Before two-way radio allowed us to "jump in" almost immediately, such shutdowns often stretched into hours.

For example, maintenance men are working on the final drive on a tractor. They need emergency help—the heavy track must be lifted off. From a pickup truck, two-way radio puts the foreman in instant contact with our base office. A nearby front-end loader is located and dispatched to the scene. Minutes later, the lift is made and work goes smoothly on.

When we picked our system, we chose Motorola's "Private Line" radio to eliminate possible interference from nearby radio transmitters operating on the same frequency. We figured that contact to and from our mobile units would be frequent, and we wanted to make sure all messages would be received and understood without the need for repeating them.

ACTIVE WITH USE ONLY

With "Private Line" radio, mobile receivers in our system are activated only when a message is transmitted from our base station. The receivers

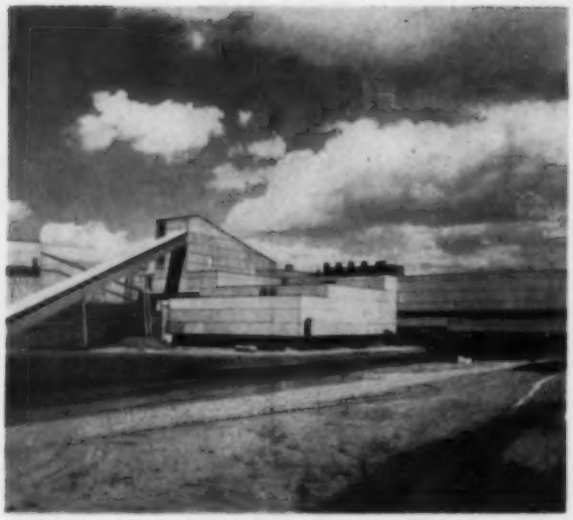
UTILIZATION

RADIO SUMMONS brings tractor loader from tipple for quick track lift in repairing tractor, an example of faster action in emergencies.

are silent at all other times. This permits the driver to carry out his duties without constantly listening to pick out a message for him mixed in with "traffic" from other stations.

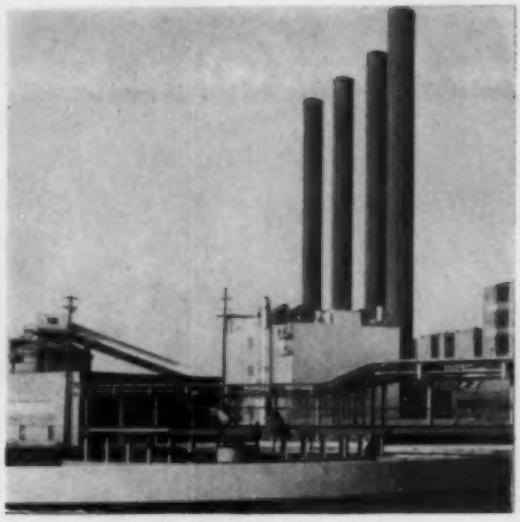
When we were "breaking in" our new radio system we found it a great help to keep a small directory on the dashboard of mobile-equipped vehicles. The directory gives unit numbers, the names of individuals who may be contacted, and instructions on radio procedure.

We feel that our investment in two-way radio has proved out well. Employee morale has never been higher. A new feeling of teamwork has developed, and some of the old timers still are amazed at the speed with which breakdowns and emergencies are "put right." Another thing, everyone feels closer to home now, as emergency messages can be quickly relayed to them through the office telephone and the base two-way radio station.



Coal Source

PIPELINE COAL for the plant in Cleveland will come from Hanna's Georgetown (Ohio) preparation plant.



Coal Destination

NEW EASTLAKE PLANT at Cleveland will use more than 1¼ million tons of pipeline coal a year.

Pipeline Coal Transportation

Why Pittsburgh Consolidation's Georgetown-Eastlake coal pipeline was built, how it will be operated, what the expected benefits will be, and what the future of coal pipelines may hold.

By CLARENCE A. DAUBER
Director of Civil and Mechanical Engineering, The Cleveland Electric Illuminating Co., Cleveland, Ohio

THE YEAR 1957 should be a historical milestone for the transportation industry. It will herald the first commercial conveying of coal a long distance other than by wheeled vehicles or by vessels. The conveyor in this case will be a pipeline. This method could well be used to transfer other bulk materials.

The story of this particular project started in 1949, when the Pittsburgh Consolidation Coal Co. realized that to retain their competitive position, cheaper means of transporting their product must be obtained. At that time, for hauls of 100 mi or more, freight rates were almost equivalent to or greater than the charge for fuel at the mine. In addition, there appeared to be no end in the spiraling of transportation costs.

The Cleveland Electric Illuminating Co. also had several problems. Coal could be carried by rail past the doors of its plants to nearby Lake Erie docks and loaded into boats at 38c per ton cheaper than it would be delivered into the plant yard. As a result, competitors up the Great Lakes are indirectly being subsidized by the Illuminating Co. Furthermore, companies with service areas nearer the coal fields are able to generate power cheaper and thereby undersell the Northern Ohio utilities. Also, inflation was outrunning all cost-saving measures which could be adopted. This portended a needed rise in electrical rates which is undesirable.

RESEARCH AND DEVELOPMENT

The Pittsburgh Consolidation Coal Co. realized that it already had been operating equipment which could furnish an alternative. It was embodied in a modern coal cleaning plant. The practice in many cases is to make a coal-water slurry, dewater and then dry. If the slurry preparation was kept at the source and the dewatering and drying shifted to the point of coal use, the additional equipment needed would be a longer pipeline in between for conveying the slurry.

To see if such a proposition was feasible, a small pilot plant was constructed at Library, Pa. It consisted primarily of a storage tank, a pump and a short, small-diameter pipeline which returned a slurry of coal and water to the tank. After it was determined that such a method could be used, an installation was sought which would allow operation under actual conditions.

Abstracted from a paper presented at the 19th annual American Power Conference, Chicago, March 27-29, sponsored by Illinois Institute of Technology.

Coal Route

SHOWN HERE IN CONSTRUCTION STAGE, new pipeline will move coal 108 mi with three pumping stations to drying plant at Eastlake terminal.

Pittsburgh Consol, knowing that the Cleveland Electric Illuminating Co. would be interested in such a proposition and that they had an almost ideal situation at their Eastlake Plant for the receiving end of such a pipeline, approached the Illuminating Co. This resulted in economic studies to determine whether such an installation was logical from the cost standpoint. The results indicated that there were good possibilities. This led to constructing a $2,000,000 pilot plant which would simulate the conditions of a pipeline between the Georgetown cleaning plant of the Pittsburgh Consolidation Coal Co. and the Eastlake Plant of The Cleveland Electric Illuminating Co.

This pilot plant consisted of many of the components required in a complete installation and the necessary equipment to pump a coal and water slurry 108 mi. This verified mechanically that such a method of transportation was possible. From the results obtained with this second large pilot plant, the economics were again calculated. They proved that there were possible big savings with such a method.

To verify the results of the study, the data were given to an experienced engineering firm. It in turn concurred. This led to an agreement between the Pittsburgh Consolidation Coal Co. and The Cleveland Electric Illuminating Co. to have such a line built.

OTHER PIPELINES

It will not be the first time that a pipeline has been used to transport solids. Back in 1889, Wallace C. Andrews, founder of the New York Steam Corp., actually built a pilot installation which in many ways was a duplicate of the one being proposed. This pilot plant was constructed in New York City, and was operated for a period of time.

In France there is a short pipeline, approximately 7 mi long, which is used to convey coal from a cleaning plant to a power plant. In the French line the flow depends primarily upon gravity, whereas here it is accomplished by pumping.

THE COAL-LINE SETUP

There are three main parts to a coal pipeline. The first is the preparation plant, the second is the pipeline, including its pumping stations, and the third is the dewatering and drying terminal.

The preparation plant is at Georgetown, Ohio. Here is the large coal cleaning plant which serves the many mines of the Hanna Coal Div. of the Pittsburgh Consolidation Coal Co. The pipeline follows a northerly course from this cleaning plant. In addition to the initial pumping station at Georgetown, there are two stations enroute. The second is located at Carrolton, approximately 30 mi north of Georgetown, and the third is at Atwater, Ohio, approximately 30 mi north of Carrolton. The dewatering and drying plant is on the site of the Eastlake plant of The Cleveland Electric Illuminating Co. in Eastlake. It is the most modern plant that the utility company has with an aggregate capacity of 660,000 kw. It consumes approximately 1½ million tons of coal a year.

The main source of coal at the Georgetown cleaning plant is the fines from the Deister tables. Approximately 80% of the coal which will be pumped is of this origin. The clean slurry coming from the Deister tables is pumped to the preparation plant of the pipeline.

SOURCE OF WATER

A large, constant quantity of water is required in the transportation process. Several alternatives were studied to find the most economical source. The studies resulted in increasing the capacity of an existing lake by raising the dam height. The lake now contains 6 mo supply.

PIPELINE PREPARATION PLANT

The principal preparation-plant items are crushers, screens, storage tanks, drag tank, and slurry-mixing equipment. The fine coal pumped from the cleaning plant drops onto screens. The size going through the screens is suitable for the pipeline slurry, and passes into a drag tank. The oversize coal is carried to the crusher, where it is reduced to the proper dimensions, or is conveyed to a storage pile. The product from the crusher can either be returned to the drag tank or put in a storage pond. The run-of-mine coal required to make up the deficiency between total needed and the Deister fines is crushed and then sent to the first crusher for further reduction in size before proceeding to the sizing screens. The coal going through the sizing screens will all pass through a 14-mesh screen.

The coal in excess of pipeline requirements can be directed to any one of three storage ponds. The first storage pond takes any fines which overflow from the drag tanks. The second pond is for the excess product from the drag-tank discharge. The third pond is for storage of the oversize particles from the screens. The reason for storing the different sizes separately is to minimize segregation which would occur if all fractions were sent to the same pond. Also, the different sizes can be recombined in the same ratio as existed in the feed to the tank. Furthermore, this arrangement allows the reduction of the oversize particles without feeding all coal through the crushers.

The purpose of the storage ponds is to permit continuous operation of the pipeline when the cleaning plant is out of service. The pipeline will operate on a 24-hr, seven-day-week basis, whereas the Georgetown clean-

ing plant is on two or three shifts, five days a week. As a result, the preparation plant was designed for 300 tph, whereas the pipeline requires only 150 tph. It is the difference that must be stored.

To insure the proper slurry concentration, by weight 50% coal and 50% water, the discharge from the drag tanks is processed in a mixer. At this point, automatic equipment continuously measures the mix and adds the proper amount of water.

PUMPING THE COAL

The slurry from the mixer is pumped to the suctions of the pumps in the initial pumping station. There are three pump units at each of the three locations. Each unit consists of a Wilson-Snyder reciprocating pump driven by a 450-hp squirrel-cage motor through hydraulic couplings and a speed reducer. Two pumps are required to supply the total requirements of the pipeline. Each will pump approximately 530 gpm of slurry which has 306 gal of water in it, the balance being coal. These pumps are capable of discharging the slury at 1,000 psig. The discharge from each pump goes into a single surge tank feeding directly into the pipeline.

The two booster pumping stations enroute are similar except for two reservoirs each, one for an emergency supply of water and the other for emergency dumping of slurry. The water will be pumped from wells at each site.

The hydraulic coupling insures automatic compensation for pump wear. The third pump is a standby for maintenance which will be done when the volumetric efficiency of anyone drops below 80%. These particular pumps are constructed for ease in disassembling and the layout of the pumping plant is such to minimize the time required for maintenance. The pumps were built primarily for handling solids and are used extensively in forcing "mud" to oilwell drill bits. Provisions have also been made to minimize stoppage of flow. Controls will automatically bypass any of the booster stations having a power failure and the preceding station will be adjusted to carry the additional burden.

THE PIPELINE

There is a single pile leading from each of the pumping plants. It is a 10¾-in O. D. steel pipe with all-welded joints. The wall thickness depends upon the location in relation to the pressure, which becomes lower as the flow proceeds through the pipeline. The thickness does not exceed 0.7 in. The entire pipeline is buried below the frost line some 4 to 5 ft under the surface.

Inasmuch as the line goes over hilly terrain, it was necessary to limit the maximum inclination. If it was too steep, the coal would have a tendency to roll back even though the water continued on its path. The maximum inclination permitted was 10 deg.

The velocity in the 108-mi line will be approximately 4.5 fps. The time lapse from the point of introduction to delivery will be over 30 hr. Pilot line operation indicates that no harm will result if the pumps fail and the velocity of the slurry drops to zero. It was found in the pilot system that even though the coal will drop to the bottom of the pipe, it will not compact. The increase in the water velocity caused by partial blocking of the pipe by the coal when flow is restarted is sufficient to turn the coal and water into a slurry.

EROSION

A usual question is: "Won't the eroision be excessive and cause rapid wear?" It is true that some erosion will take place. However, it will not be of the degree usually expected. There are several reasons for this. One is that the coal will be much cleaner than that normally handled; it is the ash and silt that is excessively erosive. Also, coal itself has greasy qualities. Another phenomenon is that the erosion decreases after the coal is pumped a short distance. The sharp corners are worn off, and the particles become spherical. Nevertheless, 20 yr of wear thickness was added to the thickness required for pressure and safety.

CORROSION

A problem as great or greater than erosion is corrosion. This corrosion could occur either on the exterior of the pipe or the interior. The exterior corrosion is normal to any pipeline. This is minimized by an enamel coating reinforced with glass cloth over the exterior surface. In addition, after a period of operation, the pipeline will be given cathodic protection.

The interior corrosion could be initiated by two ingredients in the slurry. One is the acid solution formed by water leaching sulfur compounds from coal. The second is the oxygen dissolved in the water.

To minimize interior corrosion, means to chemically treat the slurry have been provided. Caustic will be added to neutralize the slurry. The goal is to have a minimum pH of 6½. The action of oxygen will be arrested by introducing an inhibitor into the slurry. In addition, nitrogen will be used in the surge tank heads. Treatment will be done at the three pumping points because better control will be accomplished this way rather than at one source.

DEWATERING AND DRYING

In dewatering and drying two 90-ft Dorr thickeners initially receive the coal from the pipeline. The coal falls to the bottom of the thickeners and the water over the rim of the tank, flows to a flocculator. The flocculator has a center section in which paddles rotate at a very slow speed. The gentle motion imparted to the decanted liquid, which will contain approximately 100 parts per million of solids, tends to make the solids agglomerate. To assist this operation, an agglomerator will be added. The enlarged coal particles eventually float out into the outer section of the 85-ft-diameter tank and gradually drop to the bottom.

The overflow from the flocculator, approximately 525 gpm, is conducted to a discharge canal of the power plant. The overflow will have approximately 10 ppm of solids. In addition to the agglomerator, a chemical will be introduced into the Clariflocculator to maintain a maximum of 1 ppm of chromate oxygen inhibitor in the overflow. The plant discharge canal normally has an outflow of 400,000 gal of circulating water per minute and will assist greatly in diluting the effluent from flocculator.

The sludge from the Dorr thickeners and Clariflocculator is pumped to vacuum disc filters. It is estimated that this mixture will be 42% water, and 58% coal by weight. The coal cake formed on the filter discs will contain approximately 20% water. This is still too wet to process in the power plant. To reduce the moisture further, there are four Raymond flash dryers. Each two dryers are furnished warm air from a special furnace. A portion of the coal supplied to the plant, approximately 3%, will be burned in the furnace in pulverized form. The heated gases leaving the furnaces will be tempered with normal air and sucked up into one of the two drying columns. These columns are approximately 3 ft in diameter and 65 ft in height.

The filter cake is fed into the bottom of the columns and is picked up by the gas being drawn up through the columns. A large portion of the moisture in the coal vaporizes and mixes with the heated gases. The gas and coal mixture from each drying column is directed into a cyclone col-

lector. The heavier coal falls into the bottom of the collector and the moist gases go out through the top. The coal will be reduced to approximately 5% moisture in the latter operation.

The hot gases drawn from the dryer cyclone will be pulled through a second cyclone-collector system, and thence to a water washer. The gases will be drawn through the system by induced-draft fans which will discharge into two power plant stacks. The reduced ash of the coal will bring the solids discharged from these stacks down to 65% of what it was before the use of pipeline product.

The coal from the initial cyclone separators will discharge to a belt conveyor which will convey it to a 1,200-ton surge bin. The weight of the coal will be measured by an automatic scale forming a part of the belt conveyor system. The coal dust from the secondary collector will be used primarily to fire the hot-air furnaces.

At 8-hr intervals, the coal from the surge bin will be fed to the 1,200-tph conveyor system, which will take the dry-plant coal to the plant coal storage bunkers. The surge bin is required so that the main conveyor system need not be operated continuously.

EASTLAKE COAL REQUIREMENTS

The coal pipeline will furnish approximately 80% of the coal burned in the power plant. The additional coal needed will be brought in either by truck or rail. It is estimated that 1,250,000 tons a year will be delivered by the transportation system described.

The product from the pipeline will be very fine. Although coal does have a tendency to agglomerate in large particles as it passes through the dryers, it does not take much pressure to crush the agglomerated particles. Inasmuch as the coal particles are very fine, there is no intention, at present, to store pipeline coal. The samples taken from the pilot plant were such that a high wind could easily blow a large amount away without too much difficulty.

The existing 400,000-ton pile will be maintained for emergency purposes until considerable experience has been obtained on the reliability of the pipeline system. In addition to the storage pile at the plant, there will be 100,000 tons of storage capacity at the preparation plant. This is to provide first, as mentioned previously, for the normal closing down of the Georgetown washing plant, and secondly, any stopping of operations at the washing plant.

ECONOMICS

The total cost of the project will be approximately $12½ million. Some $2½ million of this amount went toward constructing the dewatering and drying terminal. The actual construction costs approximated the original estimated figures. The entire project is owned by Pittsburgh Consolidation Coal Co. It will operate and maintain the preparation plant and pipeline. Operation of the dewatering and drying facilities will be the responsibility of The Cleveland Electric Illuminating Co.

In calculating what the cost would be to ship coal by pipeline, 15-yr amortization was used. All the factors, such as, cost of money, taxes and insurance, are fully charged. The use factor for the system is expected to be at least 90%. The net result was a substantial saving in relation to the present railroad tariff of over $3.30 per ton from the Georgetown cleaning plant to the Eastlake power plant.

The saving should be greater than anticipated in the original studies. The main reason is that all the equipment is substantially oversize. There is no doubt that some of the oversizing will make it possible to transport a greater amount than used in the calculations. This can be done at low additional cost. Also, a substantially large portion of the pipeline costs are fixed as compared to railroad cost and future increases in labor component will have less effect on the cost of transporting coal by pipeline.

There are several other advantages and disadvantages to shipping coal by this method. One of the advantages to the supplier is a long-term steady consumer. In this particular case, he is assured of a definite amount for a 15-yr period. This will permit him to plan his mining operations better, and make use of cost-saving equipment. The disadvantage to a supplier is that he is furnishing a single source with a large portion of his product. The receiver has the disadvantage of less competition by coal suppliers.

The contract required in such a relationship is very complicated. To be fair to both parties, a basis for adjusting costs and prices must be established. Factors that must be taken into account include variations in cost, labor, materials, supplies, taxes, and insurance. This must be done through escalation clauses. The parties to such a contract must deal in good faith because the factors involved are so complicated.

PIPELINE SUMMARY

Although the transportation of coal by pipeline will be expanded in the future, it will not serve all requirements. The conditions must be ideal in order to make it competitive with other methods of transportation. In the first place, the quantities transported must be large to break even. If the amount should be greater than that supplied the Eastlake plant, the per-ton savings would be much larger. The reason is that the initial cost and operating and maintenance expenses would not increase in proportion to the increase in tonnage handled. Furthermore, many of the facilities supplied could be used for a system having many times the capacity.

In most cases, it would not pay to move the material this way to a central disposal point and then by another means to other localities unless the savings are much greater than for this particular system. The additional handling costs would overcome any advantages. There may be possibilities, such as, using a tanker to convey the thickened slurry from pipe terminal to point of use.

If normal transportation costs are proportional to the distance shipped, the potential savings by pipeline will be greater. The preparation and dewatering facilities are the same regardless of the length of the line. The line and pumping equipment would be components having increased costs.

If the power plant had been built especially to burn the new product, the savings would have been greater. Some equipment is capable of burning coal from such a line without pulverizing. In addition, the hot air furnaces could have been eliminated if original plans would have allowed use of power-plant stack gases in flash dryers.

The pipeline should be successful from the mechanical standpoint. This statement is based upon the fact that although the arrangement of the equipment is revolutionary each individual unit has been used with good results in other processes for long periods of time.

The overall conclusion is that pipeline transportation is here to stay if present freight rates are maintained. There will be a larger number of lines in the future. Many will be used to convey a variety of bulk materials. It will be a major factor in being able to provide electric customers "Better service cheaper."

ACKNOWLEDGMENTS

The author wishes to express his appreciation for the assistance given by Victor Hanson, chief mechanical engineer, Pittsburgh Consolidation Coal Co., and Gordon Walker, senior project engineer, The Cleveland Electric Illuminating Co. Both contributed extensively to the preparation of this paper.

35% Under Bolted Roof

In 1956 in the United States 424 bituminous coal mines used systematic roof bolting as a method of roof support, six fewer mines than in 1955. Of these, 159 mines used bolts as the sole means of support. Average monthly production in 1956 was approximately 31.33 million tons. At mines using bolts average monthly production was 17.5 million tons of which 10.96 million were mined under bolted roof, according to report from **E. M. Thomas,** mining engineer (roof control), USBM.

Roof Bolting In 1956

Millions of Bolts Used

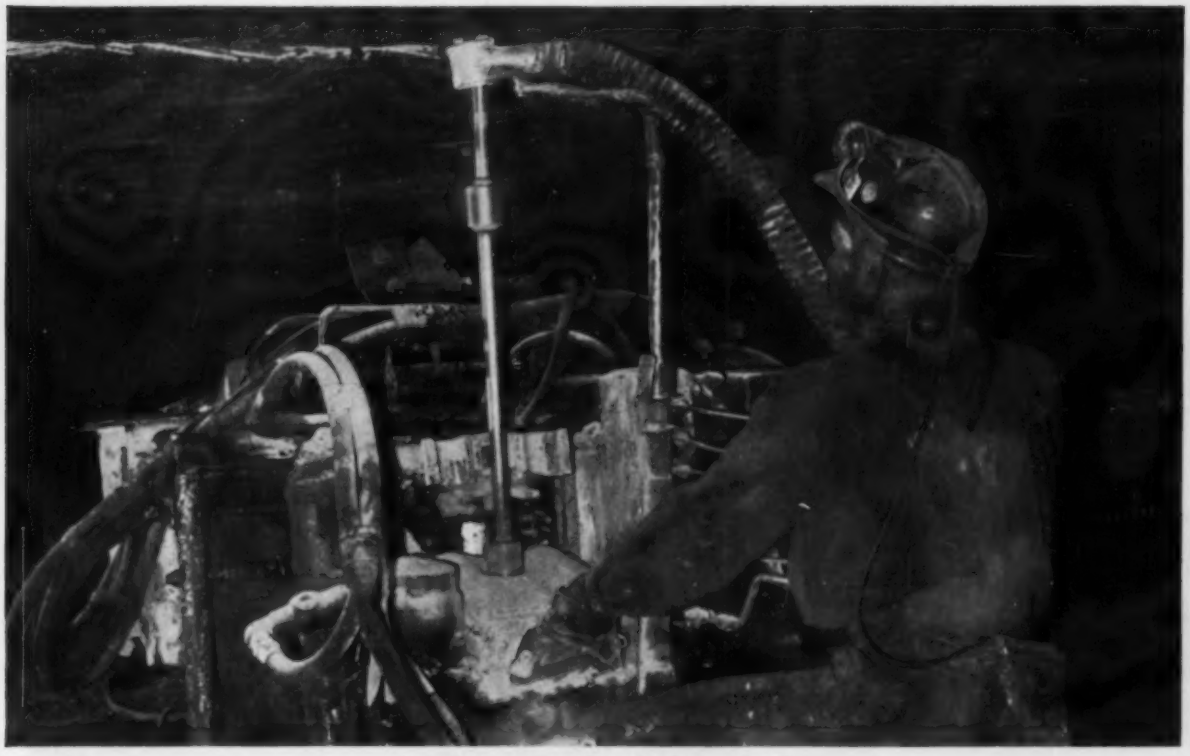
Roof bolts were used in bituminous coal mines last year at a rate of 2.64 million per month, a decrease of 0.36 million per month as compared with 1955. In the mines employing roof bolting, 40% use ⅝-in (C-1040) bolts; 1% use ⅞-in (C-1020) bolts; 29% use ¾-in (C-1020) bolts; 1% use ¾-in (C-1040) bolts; 5% use 1-in (C-1020) slotted-type bolts, and 24% use two or more of these types.

Drilling Roof Holes

Drill holes in 84% of the mines using bolting have a finish diameter of 1⅝ in; 13% drill 1¼-in holes, and 3% use 1½-in holes. Data on types of anchors used show that 91% of the mines use expansion shells, 3% use slotted type bolts, and 6% use both types. There was no record of wood bolts being used in 1956.

Controlling Dust

Among the 424 mines using roof bolts, 8% employ water to allay dust, 35% employ dry dust collectors, 10% use water with drilling in parts of their mines, and 44% employ no means of dust control other than respirators. (Use of mask-type respirators is not considered an acceptable means of dust control in these tabulations of USBM inspection reports.)



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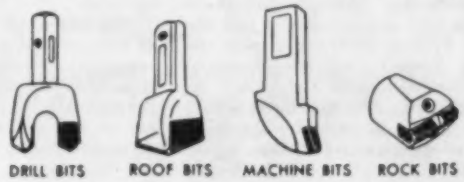

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COAL AGE

FOREMEN'S FORUM

Supervisors and industry leaders will find food for thought in these views by Clifford F. Hood, president, U. S. Steel Corp., on what must be done to insure the bright future predicted for industry. Mr. Hood's ideas are taken from his talk at Texas A&M in February.

CLIFFORD F. HOOD,
President, United States Steel Corp.

Balance, Continuity, Emphasis

THE MOST DIFFICULT FUNCTION of executive management is not necessarily one of command, but that of developing the will and desire of every member of the enterprise to work together for a dominant single purpose. It is in accepting such a responsibility that the industrial executive of today finds increased need for a yardstick of fundamentals to measure each task, and since it was suggested that I draw upon my own experience in our discussions today, my personal yardstick consists of three categories—balance, continuity and emphasis—which are basic to any activity, whether one is managing a business, or whatever.

It has been my belief that unless a business or an individual seeks to measure every effort against these three factors, the final result will fall short of the success which could be attained. Suppose we consider some of the specific responsibilities of today's industrial executive in the light of balance, continuity and emphasis.

I suspect there are few factors more vital to effective business management than maintaining balance throughout every aspect of one's company, and the balance I have in mind begins with the individual himself and his efforts to maintain equilibrium in his outlook toward each segment of the business. He must recognize, for example, the basic concepts of effective and efficient organization. Among his powers of leadership should be the ability to duplicate himself in others and delegate authority to them. He should be aware of the business truth that discipline is the control circuit of any organization, and possessing such knowledge, he should utilize it largely to motivate people.

Possession of these and other capabilities, however, is not enough for an individual in a position of leadership. He must be able to utilize these abilities with sound judgment and skillful balance, if he is to develop an organization that is, in turn, well-balanced and constantly seeking the ultimate in productive capacity.

In speaking of balance, I would be remiss if I did not mention the specific area of human relationships and the fundamental need for a balanced outlook toward these relationships by every member of management. From the level of the front-line foreman to that of the chief administrative officer, there are human factors to be considered, and no one should be permitted to climb the proverbial management ladder until and unless he has demonstrated an awareness of the human element in the industrial equation.

Just several years ago, many members of management were startled by various reports on the attitudes and opinions of industrial employees. These reports indicated that a considerable group still exists among the members of industry who do not recognize the mutuality of interests between management and employees. Perhaps we have concentrated too much of our attention on the organizational aspects of the objectives of management and, by this unbalanced approach, have failed to stress to our workers the basic fact that only attitudes of cooperation, willingness and understanding can successfully increase personal opportunities and personal success.

I have long believed—and many business analyses bear me out—that the most complex problems of present-day management, are problems in human understanding. People represent the greatest asset that any business can possess, and understanding their instincts and desires, their emotions and beliefs, their habits of thought and action, is one of the requisites to maximum industrial achievement. And just as the business leaders of tomorrow will undoubtedly be those individuals in groups such as this who can answer the questions in human relationships, so the leading industries of tomorrow will be those that stimulate their management people to recognize that the functions of management thread their way through every human activity.

Every business is created in the hope that it will remain a perpetual member of industry. Those entrusted with directing the affairs of business, therefore, acquire the second fundamental responsibility—continuity. This is not only an essential function of management, it is also a very complex one, whereby each problem and each plan of action is viewed from the standpoint of its ability to give continuity to the organization.

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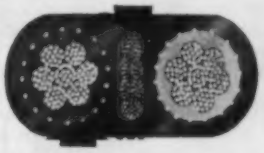

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CORPORATION

There is, for example, the matter of building a reservoir of executive talent fully capable of meeting the challenges of industry with imagination, vision and determination. It was recently estimated by a management consultant that forty-two per cent of industry's top management personnel are in the age bracket from fifty-five to sixty-five. If this estimate is correct, one easily can understand why business firms from coast to coast are seriously concerned with efforts which will assure continuity of leadership.

Another vital area which cannot be overlooked in maintaining the continuity of a business is the task of developing industrial research facilities to their highest potential so that research planning and activities are always many years ahead of actual demands. Likewise, there are the parallel responsibilities of creating new markets for the endless line of items brought forward by research, and always, there remains for the business leader the problem of seeking out new avenues of efficiency in manufacturing operations.

Of most importance, however, are two critical and inter-related subjects facing all of us today on this very matter of continuing our respective businesses as part of American industry. During recent years, our nation's economy has grown at a phenomenal rate. From 1950 to 1955, national income climbed an estimated 35%. Personal income increased 35%, and the Gross National Product rose an astonishing 37%.

The factor behind this economic progress was our industrial know-how and vision. But did corporate earnings experience a period of equal growth? I can assure you they did not. The *New York Times* pointed out in an article on this subject that the 1955 ratio between total revenue and profits before taxes was no better than the ratio achieved some thirty years ago, in the so-called Roaring Twenties.

Corporate profits after taxes have been on a roller-coaster for many years. During the years from 1950 to 1953—a period of unbroken business prosperity—corporate profits after taxes reached one of the lowest points since the end of World War II. Even last year's estimated profit—measured in constant dollars—was below the balance remaining after taxes a full eight years ago.

Yet in the face of this, we are encountering demands for unheralded industrial expansion. One estimate made about a year ago stated that all industry would be required to make a total investment of some 580 billion dollars in capital for replacement and expansion purposes before another decade passes.

To indicate just how tremendous a sum of money this is, I can tell you that it is twice the size of the federal government debt—and you know what a large amount that is. Another way of looking at it is to say that industry, big and small, must find and put to use almost a billion dollars in investment capital every six days for the next ten years. The dilemma this presents for industry is similar to that of the basketball coach I heard about who had the ill-fortune to have a son, a brother-in-law and a nephew of the college president all vying for the same position on the team.

Business leadership in this nation has directed great effort toward maintaining continuity in national progress. Such commonplace items of today as television, nuclear energy, penicillin, jet-propelled aircraft and nylon fabrics were only laboratory curiosities twenty-five years ago. Just as it was engineering and scientific genius which developed these items, it was management decision which brought them out of the laboratory and management direction which placed them upon our assembly lines and sent them to the American marketplace. We learned long ago that fundamental theory is always required in advance of applied theory and practice. By the same token, this awareness with respect to the physical sciences has equal importance in the social sciences, which include the science of management.

If we are to sustain continuity in our industrial progress, therefore, it will be through the application of a high degree of imagination, energy and effort toward better understanding of business profits. In United States Steel, for instance, our general company objectives are: "To make and sell quality products competitively, and to perform those functions at the lowest attainable cost consistent with sound management policies, so as to return an adequate profit after taxes for services rendered. As a corollary objective the corporation must be the low-cost producer of the products it offers for sale."

We recognize, however, that we cannot continue to meet those objectives unless our employees, our customers and the public are fully informed on the role of profits in perpetuating our national way of life. For this reason, we are presently taking steps to bring about greater awareness of the profit picture and the financial needs of our company, and I understand that a number of industries have similar programs in action or in the planning stages.

I am certain you will agree that it is foolhardy to develop industrial leadership for tomorrow, or point our research efforts into the distant future, or seek to stimulate new markets for our products, unless we first recognize the responsibility to keep industry financially sound and economically stable. We cannot build the economic future that has been blueprinted for us, unless we have the necessary economic tools. The only time-tested manner by which we can continue to progress is to assure business management the freedom and the wherewithal to maintain and advance industrial facilities.

And this brings me to the third and final measure—the matter of emphasis—in the responsibility yardstick. A brilliant future awaits America and its industry; however, in achieving this, business management must emphasize judgment, common sense and human understanding in the leadership it extends to the members of industry and the people of this nation. If this leadership is dynamic, if it is expressed as incentive leadership, wherein human activities are directed toward high and desirable objectives, then no goal will remain unattainable.

Each business day provides countless opportunities to emphasize those things which we know to be right and necessary to the continuation of our economic way of life. Regardless of one's separate responsibilities, whatever his level along the management scale, he owes it to the industry of which he is a part and which he helps to direct, to stress those principles which are fundamental to free competitive enterprise.

Every member of management, for example, gives emphasis to a basic ingredient of our industrial system when he places integrity above all other virtues in his day-to-day business affairs. Perhaps no other characteristic among men is more indicative of their moral caliber than the honesty they display in their dealings with one another.

The overriding concept of business and its progress in the future must be predicated on a new understanding of the material and the spiritual. Life, as it is being experienced in many quarters today, cannot continue much longer to be based on the debilitating theory of constantly "taking out." There must be a giving of one's self which emphasizes the necessity to put something into the till of life as well.

In this connection, I am reminded of the manner in which this same belief was outlined in one of the plays of Charles Morgan. The words of the soldier-philosopher, Heron, are almost prophetic as he states:

" . . . The world in which we live is obsessed by the idea of fruit—and not even by the idea of bearing it, but by the idea of consuming it. That is the insanity into which the economic interpretation of history has led us. Existence is economic, but life is not; that radical and vital contact has to be renewed."

Several decades of experience have proved beyond question that unless there is knowledge of the purpose of free enterprise, combined with a recognition of its obvious results, we cannot expect to have it accepted, developed and improved by succeeding generations of our people. Every policy and statement set forth by management, every industrial meeting and program, fails in its ultimate purpose if it is not conceived and carried out in the interests of what Peter Drucker termed "our free society and our free economy."

Some years ago, a member of my industry wrote a book on the early history of iron and steel production. I have always remembered his dedication in the front of that book, for I believe it is timeless in its application to all men of industry. It read in part, "Dedicated to those adventurers, and their descendants . . . who, tired of the monarchial, religious and civil persecutions of quarrelsome Europe, set sail with their chests of meager personal belongings on the long hazardous voyage to the New World of America, and brought to the wilderness their trades, skill and courage. And who, looking not to heaven for manna, but bending their gaze to the ground . . . laid the foundation for these mighty industries."

BOOTH 1813

1957 AMC COAL SHOW

CLEVELAND, OHIO
MAY 13-16

- My name is J. H. Sanford, Manager of the Mining Division of the Ohio Brass Company.
- I'd like to invite you backstage a minute to preview a few of the new O-B developments you'll see for the first time at Booth 1813 at the AMC Coal Show. After you've seen them, I think you'll find that Booth 1813 (the same booth we've occupied in past years) will be high on your list of "must see's" when you come to Cleveland May 13-16.
- Just turn the page and step inside—your local O-B representatives will be your guides.

OBhaulage ways

SPECIAL ISSUE • APRIL, 1957

VOLUME 28 • NUMBER 4

At Booth 1813 You'll See

a new O-B expansion unit!

This new shell and plug, expressly designed for 5/8-inch bolts with upset ears, incorporates the finest features of the basic O-B unit and has been field tested on thousands of installed roof bolts. We'll be ready to talk about this and other O-B units, as they apply to your particular needs, when you come to Booth 1813, where the time of our bolting engineers, our bolting publications, and the use of our new bolting safety film are yours for the asking!

Ed Lyons

OHIO BRASS COMPANY
MANSFIELD, OHIO

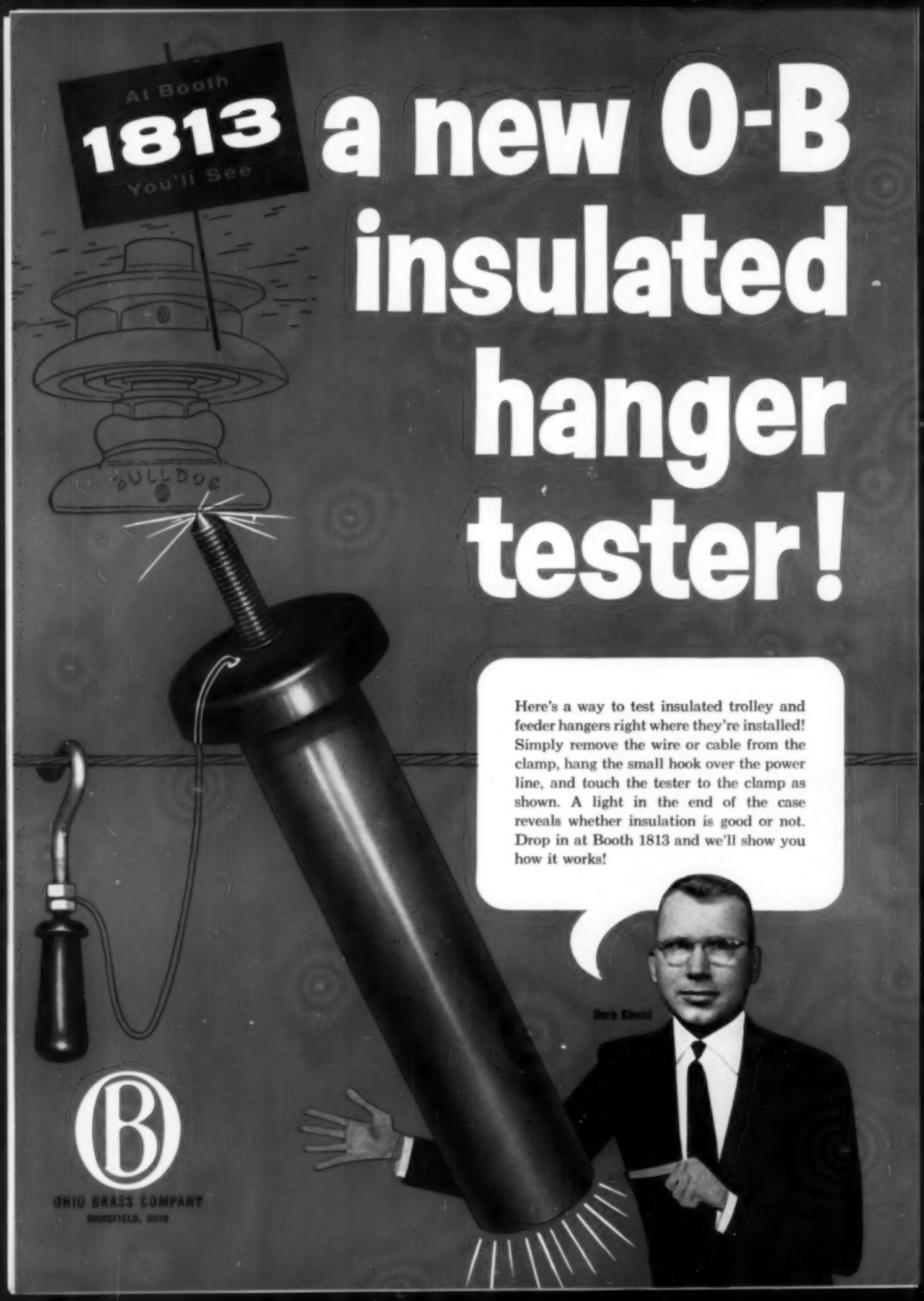
At Booth 1813 You'll See

a new O-B roof bolting safety film!

This unique O-B motion picture—20 minutes of sound, full color, and entertaining animation—covers briefly and clearly everything from the history and theory of roof bolting to recommended safety procedures before, during, and after bolting a mine roof. After you've previewed it, you'll want every last man in your organization to see it too. And they can! Schedule a private showing for one of your safety meetings while you're at Booth 1813!

Roy Manis

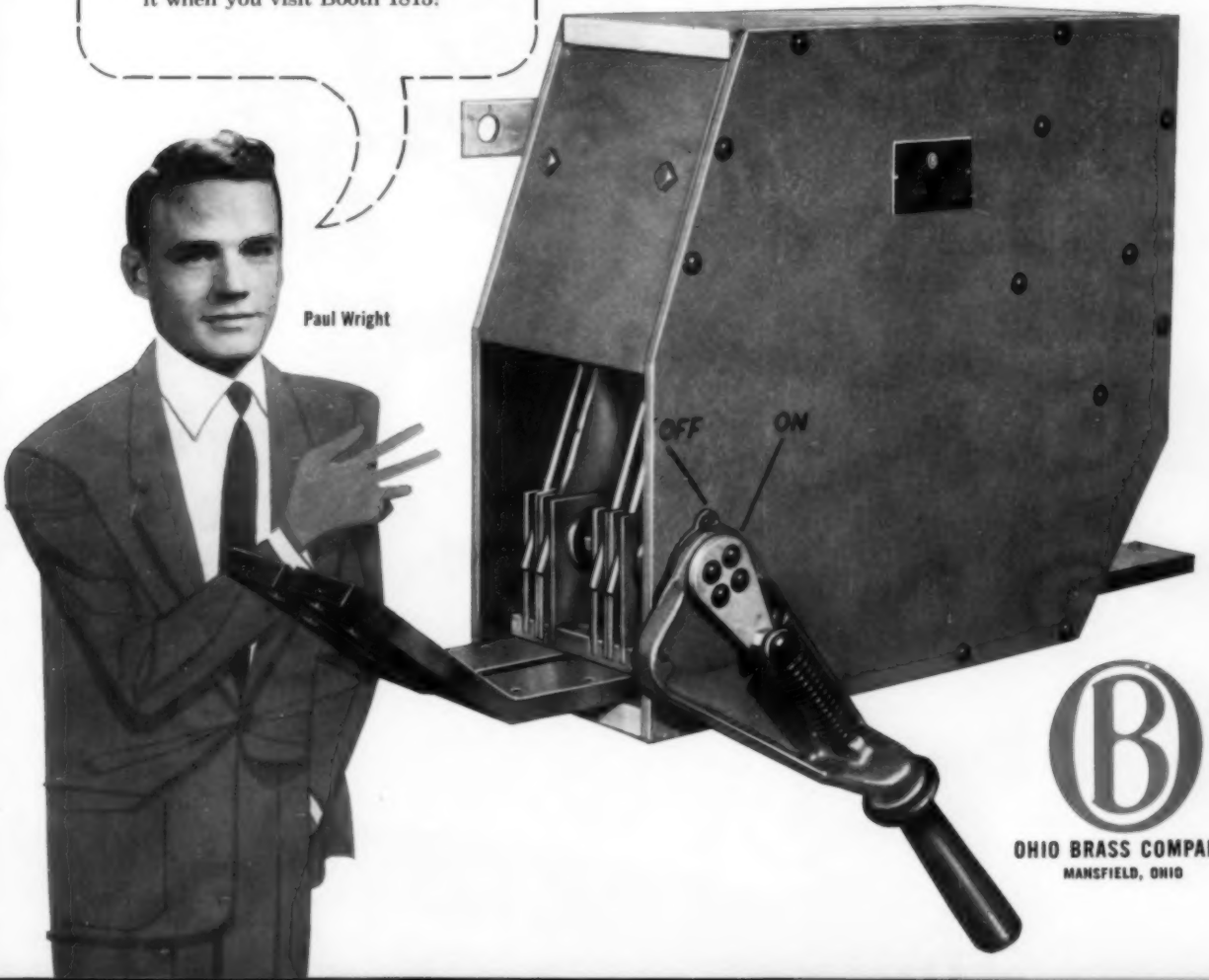
OHIO BRASS COMPANY
MANSFIELD, OHIO


At Booth
1813
You'll See
a new O-B insulated hanger tester!
BULLDOG
Here's a way to test insulated trolley and feeder hangers right where they're installed! Simply remove the wire or cable from the clamp, hang the small hook over the power line, and touch the tester to the clamp as shown. A light in the end of the case reveals whether insulation is good or not. Drop in at Booth 1813 and we'll show you how it works!
OHIO BRASS COMPANY
MANSFIELD, OHIO

At Booth 1813 You'll See

a new O-B 3,000 amp safety switch!

Here's a new development you'll be interested in seeing! It's a brand new O-B Safety Switch designed for breaking loads up to 3,000 amps with complete safety for operator and equipment. On test for over a year in actual service installations, it offers a solution to the growing problem of interrupting big electrical loads safely. Let us tell you more about it when you visit Booth 1813!



OHIO BRASS COMPANY
MANSFIELD, OHIO

At Booth **1813** You'll See

a new O-B trolley shoe!

This Type EHD Trolley Shoe is designed for service on heavy locomotives drawing unusually high operating currents. Developed after extensive field testing, it offers longer life, better action on the wire in this type of service than conventional shoes. See it at Booth 1813, where O-B engineers will be waiting to help you with any current collection problem.

OHIO BRASS COMPANY
MANSFIELD, OHIO

At Booth
1813
You'll See

a new O-B cable fault locator!

Ken Benson

Here's the simplest, lightest, most inexpensive, easiest-to-use cable fault locator ever offered for mine service! Practically unbreakable, and throw-away elements are easily replaced if they wear out after extraordinarily long and hard service. Made for rugged use in the section, not for pampering in the storeroom! See it—hear it—try it yourself at Booth 1813!

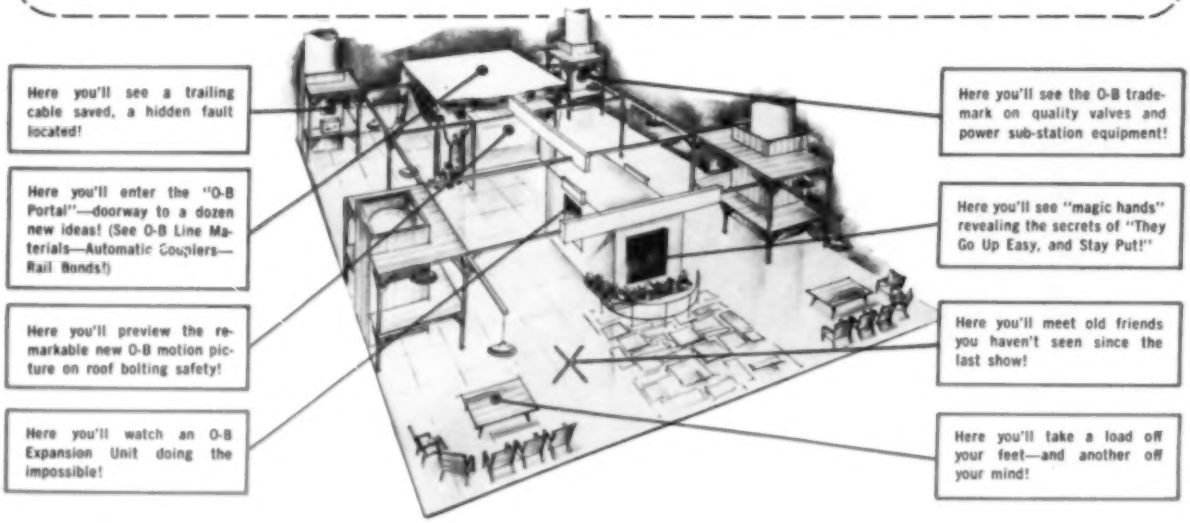
OHIO BRASS COMPANY
MANSFIELD, OHIO

At Booth **1813** You'll See

the most fascinating exhibits at the Coal Show!

Bill Preston

At Booth 1813, you'll see some of the most practical products and some of the most intriguing exhibits you ever laid eyes on! It's taken months of intensive effort to cram everything we have to show you into one large booth area, but we've done it. And we promise you that when you leave Booth 1813, you'll carry off new ideas with you!


Here you'll see a trailing cable saved, a hidden fault located!
Here you'll enter the "O-B Portal"—doorway to a dozen new ideas! (See O-B Line Materials—Automatic Couplers—Rail Bonds!)
Here you'll preview the remarkable new O-B motion picture on roof bolting safety!
Here you'll watch an O-B Expansion Unit doing the impossible!
Here you'll see the O-B trademark on quality valves and power sub-station equipment!
Here you'll see "magic hands" revealing the secrets of "They Go Up Easy, and Stay Put!"
Here you'll meet old friends you haven't seen since the last show!
Here you'll take a load off your feet—and another off your mind!

Ohio Brass

MANSFIELD OHIO, U.S.A.

In Canada—Canadian Ohio Brass Co., Lt'd., Niagara Falls, Ont.

Please add my name to your Haulage Ways mailing list.

Name_____

Position_____

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Address_____

I'm sure you'll want to follow up these new O-B developments (and others on the way) as they are reported in our monthly magazine, Haulage Ways. Join the 8,000 mining men who read this "how-to-do-it" magazine regularly — simply cut out this coupon and mail it to me for your free subscription.

480-36 Printed in U. S. A.

Underground mainline conveyor uses 36-in. fire-resistant neoprene belt. Conveyor travels at speeds of 250 and 500 fpm.

Why Westmoreland uses a NEOPRENE belt in Hampton No. 3

Westmoreland Coal Company gets consistently high output with all-belt haulage and automatic controls in its Hampton No. 3 mine near Clothier, W. Va. The mine is being developed to produce 5000 tpd of Hampton No. 3 coal.

Mainline conveyor in No. 2 West Main entry uses a 36-in. belt with a fire-resistant neoprene cover. The belt is vulcanized into one strip except for a temporary Hayden splice to permit addition of 500-ft. sections as headings advance. A similar neoprene belt has recently been installed in North Main.

Westmoreland officials chose neoprene for its balanced combination of properties. Neoprene is tougher, gives long-term economy. It resists chipping and tearing under the impact and shock of heavy coal loads moving at high speeds. A neoprene cover will continue to protect the fabric against mold, mildew and acid water. In addition, neoprene contributes to safety because it is fire-resistant, will not support combustion.

Next time you replace your conveyor belting or buy a new conveyor, be sure to specify neoprene. Its outstanding resistance to abrasion, fire, aging, oil and grease will save you money. Above ground, it is unaffected by sunlight and weather. To be fully informed on the latest applications of neoprene, fill in the coupon below to receive free your regular copies of the Elastomers Notebook.

DU PONT
REG. U. S. PAT. OFF.

Better things for better living
. . . *through chemistry*

NEOPRENE
— made by Du Pont
for 25 years

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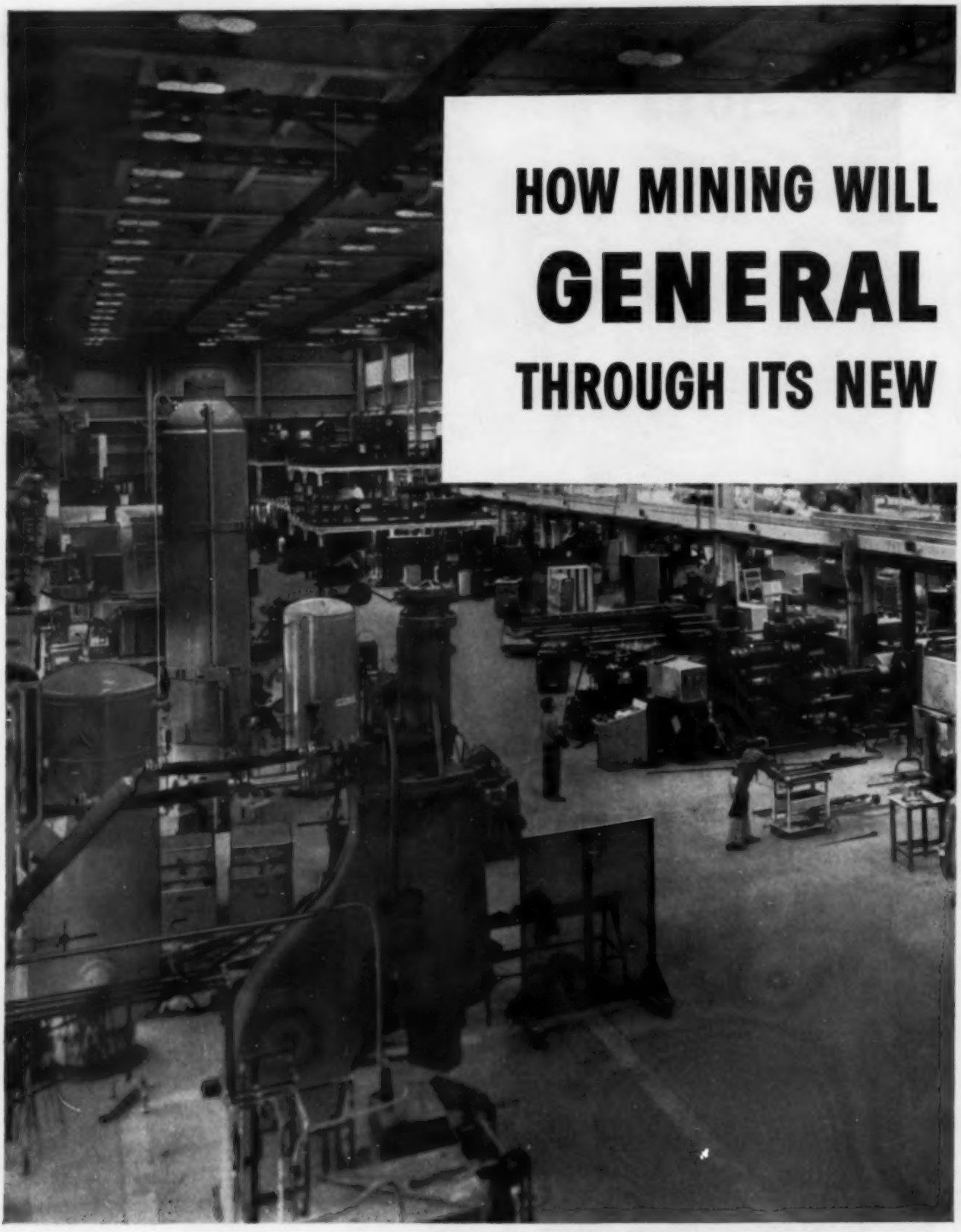
MAIL THIS COUPON . . . WHILE YOU'RE THINKING ABOUT IT



HOW MINING WILL GENERAL THROUGH ITS NEW

Laboratory with factory-size equipment—that's the new $5,000,000 metals and ceramics laboratory in Schenectady. From here will come many of the products manufactured by the Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Michigan.

BENEFIT FROM THE RESOURCES OF
ELECTRIC
METALLURGICAL PRODUCTS DEPARTMENT

Solutions to your most pressing problems, plus developments ahead of industry trends, are now being worked out in our laboratories

It doesn't take a crystal ball to know what role cutting tools will play in the Mining Industry of the future. The signs are unmistakable.

Mines are becoming more and more mechanized. The equipment now being introduced is faster, more automatic – and more costly.

This means that cutting tools must operate at higher speeds, withstand greater pressures – yet provide the longer tool life so necessary to keep equipment in continuous operation.

General Electric's tremendous resources of technological know-how and skilled manpower in the field of metallurgy have already made several important contributions toward solving this problem.

The first was Carboloy® cemented carbides – which General Electric first introduced to industry. Manufactured by the Metallurgical Products Department (successor to the Carboloy Department), carbides have the strength and wear resistance so vital to high-speed continuous miners.

General Electric engineers have also developed specialized application and maintenance techniques for carbides. And, they have come up with a complete line of carbide drills and bits that are outperforming steel many times over.

Cemented carbides may be just part of the answer to the cutting tool problem facing the Mining Industry. Perhaps an entirely new material will be needed. (A similar situation existed in the Metalworking Industry, until G-E created Carboloy Cemented Oxide for high-speed machining.)

But, whatever the need may be, G-E resources are already marshaled. Through the new Research Laboratory in Schenectady, and the manufacturing facilities of the Metallurgical Products Department, you can look forward to a parade of new developments *ahead* of the trends of the Mining Industry.

Progress Is Our Most Important Product

GENERAL ELECTRIC

OPERATING IDEAS

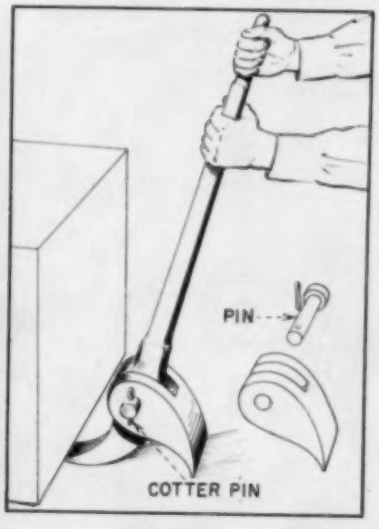
Belt Strips Give HeadRoomWarning

UNDERGROUND transportation employees at Stotesbury No. 8 mine of Eastern Gas & Fuel Associates receive adequate warning of restricted head room on the mine's haulage roads. The mine has installed "cat tails" similar to those used on railroads to warn of tunnels. When these strips strike the hard hat of a motorman or brakeman he knows he must lower his head so he will not bump it on low crossbars.

Strips of old conveyor belt have been installed at all spots in the mine where a mine timber is lower than in other locations and warn the man to lower his head. J. W. Richardson, safety inspector, is shown as he approaches one of the installations in a mine jeep.

Diverting Chute Permits Continuous Car Loading

ELIMINATION of spillage between mine cars and continuous loading are top benefits from using this lever-operated diverting chute installed at the Peabody No. 32 mine, Kenvir, Ky. Designed and built in Peabody's shop, the device has one end bolted to supports connected to the belt frame and the other suspended from the roof. The chute is mounted on a section of pipe that extends under the belt on the supports and is connected to the control lever.



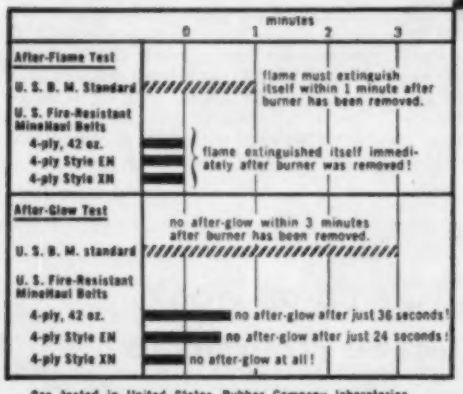
Non-Skid Crowbar Easily Made

IT'S EASY to make a non-skid crowbar, says Charles H. Willey, Concord, N. H. All you need to do is fit a curve piece of steel to the base of a regular bar. But be sure that the piece and the steel pin used to connect it to the bar are made from good steel. When the bar is placed under an object to be moved, the movable attachment drops to the ground and prevents the bar from slipping when force is applied to the bar. The extra piece can be taken off easily.

Fire-Resistant MineHaul Belt

MEETS and EXCEEDS all existing fire-resistance regulations

Comparison of U.S. Fire-Resistant MineHaul Belts with standards as set forth in United States Bureau of Mines Schedule 28*


minutes
0
1
2
3
After-Flame Test
U. S. B. M. Standard
flame must extinguish itself within 1 minute after burner has been removed.
U. S. Fire-Resistant MineHaul Belts
4-ply, 42 oz.
4-ply Style EN
4-ply Style XN
flame extinguished itself immediately after burner was removed!
After-Glow Test
no after-glow within 3 minutes after burner has been removed.
U. S. B. M. standard
U. S. Fire-Resistant MineHaul Belts
4-ply, 42 oz.
no after-glow after just 36 seconds!
4-ply Style EN
no after-glow after just 24 seconds!
4-ply Style XN
no after-glow at all!

*as tested in United States Rubber Company laboratories in accordance with Bureau of Mines test specifications.

Testing these belts in U. S. Rubber's own laboratory—*in accordance with Bureau of Mines specifications*—it was found that U. S. Fire-Resistant MineHaul Belts not only meet but EXCEED all existing fire-resistance standards (see chart to left).

These new belts have been given the Bureau of Mines acceptance designation: "Fire-Resistant, U.S.B.M. No. 28-5."

U. S. Fire-Resistant MineHaul Belts combine maximum fire safety with all the qualities you've come to expect in a "U.S." belt: optimum troughability, high impact resistance, outstanding rip resistance, excellent fastener-holding ability, added edge protection, mildew resistance—to name a few.

Obtainable at the 28 "U.S." District Sales Offices, at selected distributors, or write us at Rockefeller Center, New York 20, N.Y.

Mechanical Goods Division

United States Rubber

Air-Placed Concrete Solves Heading-Repair Problem

STABILIZING the roof and ribs in a portion of a main heading at the Joanne mine, Joanne Coal Co., Rachel, W. Va., was successfully achieved with air-placed concrete. By coating 10,000 sq ft of heading with a 2-in layer of air-placed concrete, the company eliminated the cost of concrete forms, saved space in the heading and cut the time required for the job.

A section of heading had deteriorated so badly that the company decided to take major action to repair the area permanently. The best method appeared to be some sort of concrete lining or support that would seal out air and moisture.

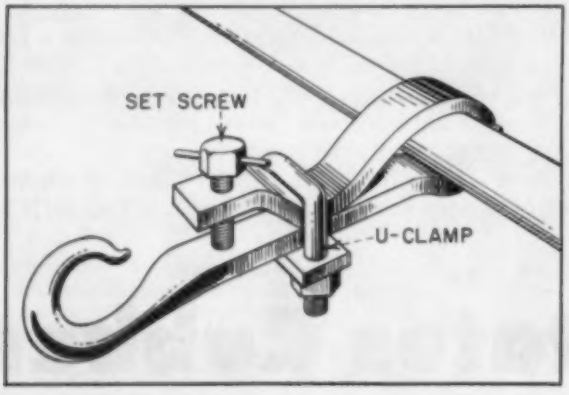
Having heard of other unusual jobs successfully completed by the Air Placement Co., Joanne management called in G. D. Heldreth Jr., general manager of the concrete construction company. The problem was outlined to him and after studying the mine, he told Joanne officials that this was a job for air-placed or gunned concrete.

Some of the problems that faced the restoration crew were: a tight working area requiring that work be done with a minimum of machinery and equipment, and state mining laws prohibiting the use of electrical machinery unless it was permissible.

The first step was to chip away all loose rock on the roof and ribs of the heading. This was done by using air-operated chipping hammers. A total of 150 tons of loose rock was removed from the heading before the concrete work began. Once the rock was removed, a layer of 3x3 No. 10 galvanized wire mesh was placed over the area to be coated and anchored to the ribs and roof with expansion bolts.

Gunning equipment included an Airplaco Bondactor gunning machine, air compressor and water-supply equipment, all mobile units which could be moved along the heading as work progressed. The only equipment needed by the men in the area where gunning was being done was the nozzle end of the material placement hose. This solved the space limitation problem.

A layer of air-placed concrete was gunned to a thickness of 2 in over the wire mesh. The mesh served as an anchor for the gunned concrete and reinforcing steel to add strength to the finished concrete. Since air-placed concrete does not sag or slump, there were no problems in gunning the vertical walls and the roof. A total of 100 cu yd of concrete was gunned on the 10,000 sq ft of heading. The job of stabilizing the roof and ribs was completed within 28 days from the time work was first started.



Clamp-on Hook Made From Scrap

HERE'S a handy clamp-on hook that can be used almost anywhere around a mining operation, writes Charles H. Willey, Concord, N. H. All of the parts can be made from miscellaneous scrap. The hook can be clamped on nearly any beam, bar, angle iron or chain. Once the set screw has been tightened, the clamp stays securely in place.

Here's MORE efficient driver speed for HEAVY Loads

ALLIS-CHALMERS TEFC Wound-Rotor MOTORS

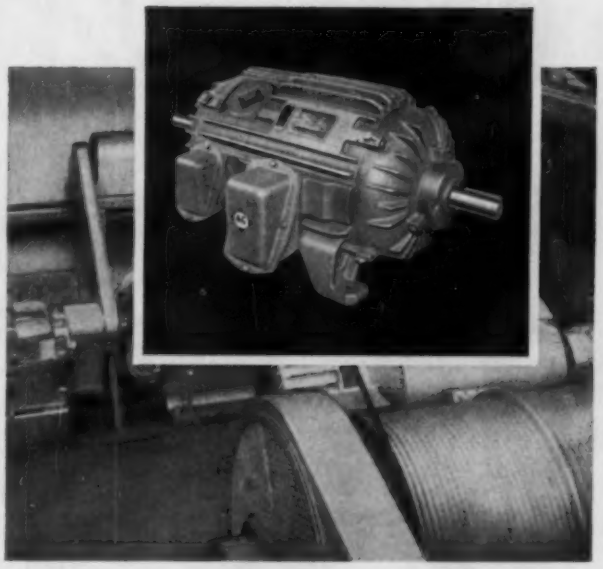
Where high inertia loads must be accelerated quickly and smoothly — yet power supply is limited — the Allis-Chalmers wound-rotor motor proves its efficiency . . .

High starting torque with this motor requires relatively low line-current. In addition, adjustable acceleration and running speed are possible through use of simple controls.

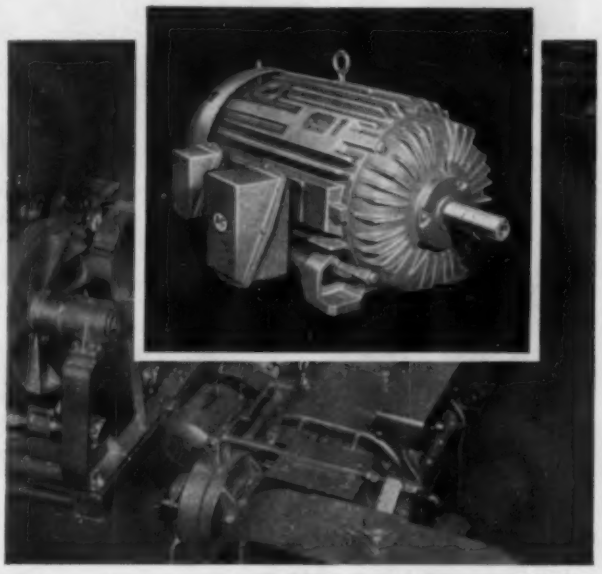
Other features of the TEFC wound-rotor motor include:

1. **Rib construction** provides ample cooling surface.
2. **Single enclosure** surrounds stator, rotor, slip rings, brushes and brush rigging. Gives maximum protection in moist, dirty, corrosive or hazardous atmosphere.
3. **Cast-iron frame** contributes rigid, distortion-free bearing support and keeps alignment true.
4. **Easy access** to collector rings and brushes permits on-the-spot inspection of brushes and commutators.

If you use hoists, lifts, cranes, conveyors, crushers or mills, find out more about the "MORE" in Allis-Chalmers wound-rotor motors. A-C motors also are available in various open types. Contact your nearby A-C sales office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.



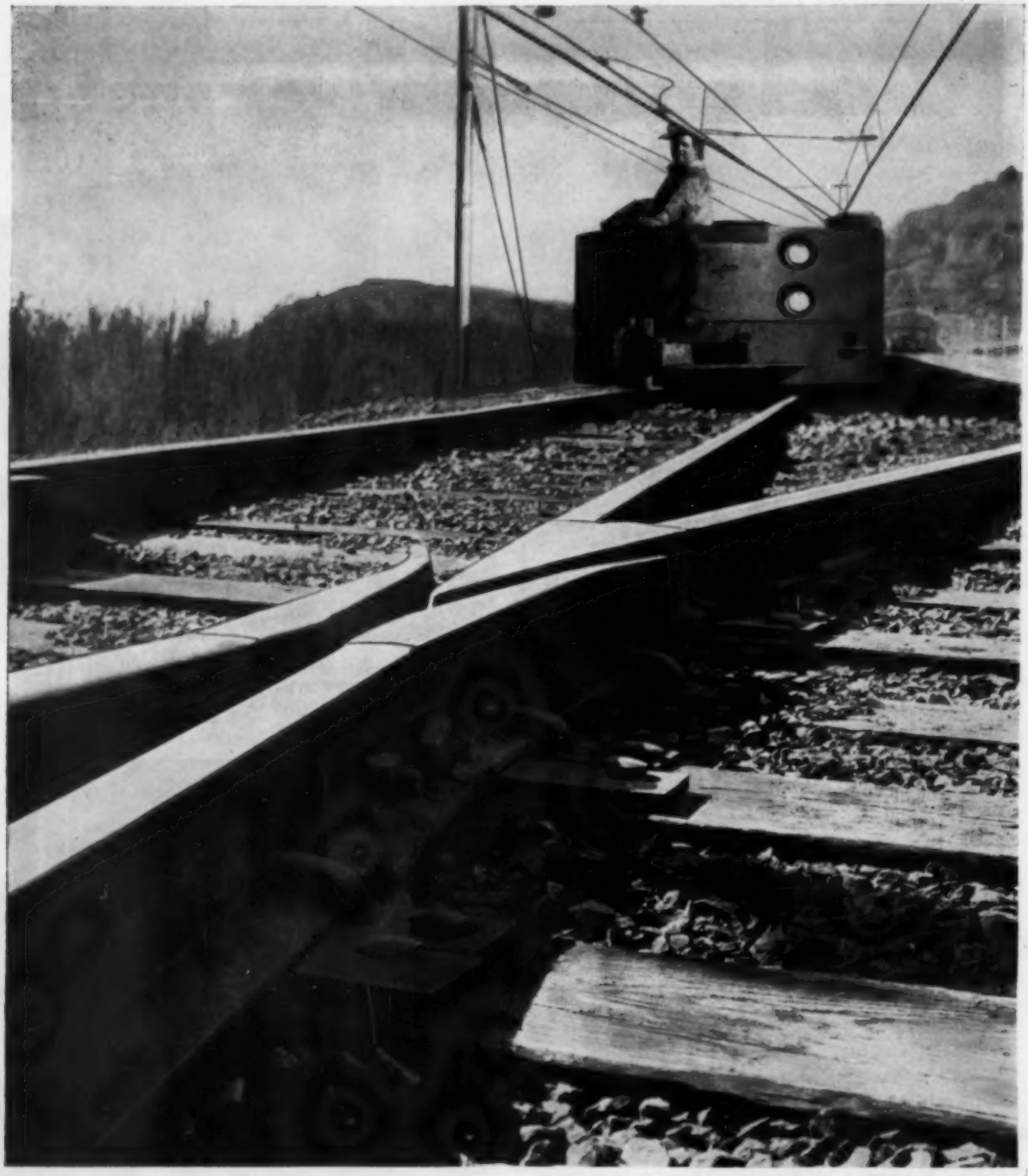
For intermittent duty, this totally-enclosed, non-ventilated model is available in frame sizes 284 to 505 inclusive. Above 505 frame, Allis-Chalmers offers its famous tube-type motor.



For continuous service, this tough, fan-cooled model is ideal. All enclosed motors can be furnished in standard enclosed or explosion-proof construction rated 55 C rise.

A-5180

ALLIS-CHALMERS



HEAVY-DUTY, HIGH-SPEED HAULAGE calls today for durable, precision-made turnout frogs. Bethlehem frogs will meet your most exacting requirements, and are available in rail sections weighing from 20 lb to 100 lb per yd. Choose between cast-manganese, riveted-plate or rigid-bolted construction, in frog numbers 2, 2½, 3, 4, 5, 6, 7 and 8. A Bethlehem engineer will gladly work with you in determining which type is best for your layout. Just get in touch with the Bethlehem office nearest you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

A 480-W dragline with a Bucyrus-Erie 14-cu. yd. bucket removes overburden at a coal mine in northwestern Kentucky.

Get the Most out of your Dragline... Use a HIGH-OUTPUT BUCYRUS ERIE BUCKET

Get the most out of your dragline by equipping it with a new Bucyrus-Erie bucket.

IT OUTPRODUCES — Full loads come easily. In digging, the weight of the bucket is concentrated to help the teeth, cutting edge and the thin "slicing-action" lip penetrate even the toughest materials quickly. The tapered basket fills full and fast. Dumping is fast and clean, helped by the smooth inside design of the basket and the extra-high arch.

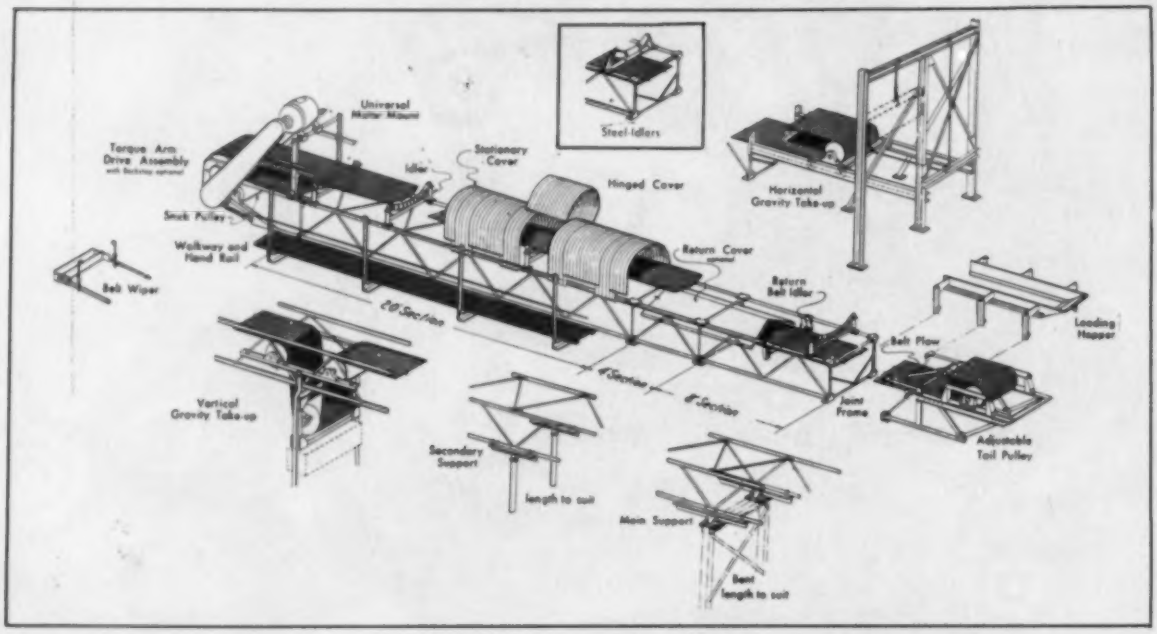
IT OUTLASTS — Extra durability and high impact resistance are built into a Bucyrus-Erie bucket through the use of BECOLOY. This tough, fibrous alloy provides exceptional strength with light weight. It is readily welded and can be cut with acetylene torch — assuring low-cost field maintenance.

See your Bucyrus-Erie distributor. He will help you select the right size and type bucket for your job — light, medium or heavy, with solid or perforated basket.

24R57C

BUCYRUS-ERIE COMPANY • South Milwaukee, Wisconsin

EQUIPMENT NEWS



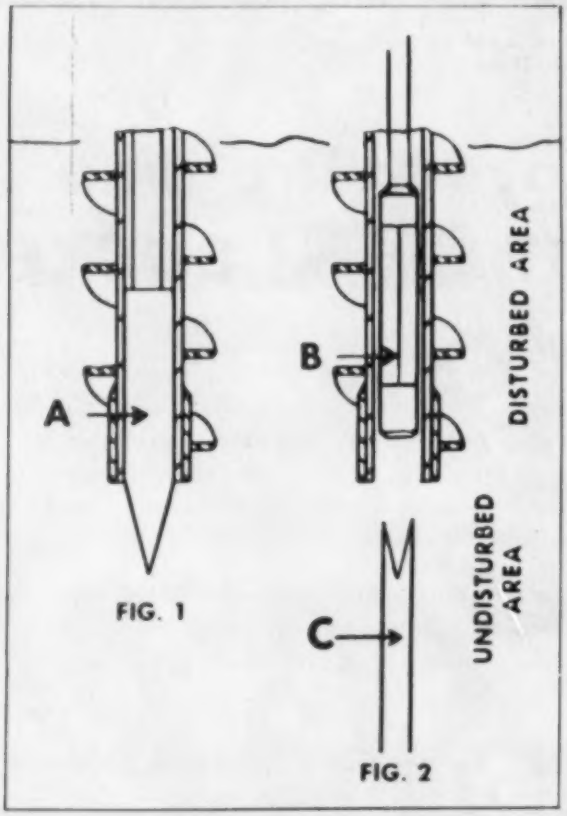


FIG. 1

FIG. 2

"Do-It-Yourself" Conveyor System

Pre-engineered, pre-fabricated components that reportedly are easily assembled in the field comprise the chief design feature of Joy Mfg. Co.'s "Ready-Span" pipe frame truss belt conveyor system. The conveyor consists of standardized sections of various lengths that are bolted in any arrangement right on the job. Thus, a user can construct any length desired. Each section is made up of four 1½-in pipe cords connected by ¾-in pipe diagonals to form a laced frame truss. Vertical diagonals are welded to the cords, horizontal diagonals are bolted. All accessories—idlers, walkways, cover decking, hoods, supports—clamp to the pipe for the desired location. The trusses are made in all standard belt widths, and in two depths: 24-in center-to-center for spans up to 50 ft; and 42-in center-to-center for spans up to 100 ft.

Samples Taken Within Auger

A hollow stem auger, the MDX 9026, is said by the maker to permit sampling without withdrawing the auger from the drilled hole. Mobile Drilling, Inc., 960 No. Pennsylvania St., Indianapolis, Ind., says the auger is used as a casing when a sample is wanted. The company adds that the unit has been tested effectively to depths as great as 100 ft.

In operation a removable plug in the drill head on the lead auger prevents material from entering the auger core. When a desired depth has been reached, the plug is removed and a sample tool lowered through the hollow augers to the strata to be tested. Wash or forced samples can be taken, according to Mobile.

Coring may be continued through the hollow stem of the MDX 9026 after rock has been reached. The center plug is removed and a diamond bit core barrel placed into the auger and lowered to the rock. Standard core drilling procedure then is followed.

Gets the best of BAD SEAMS...

CP Hydraulic Coal Drill

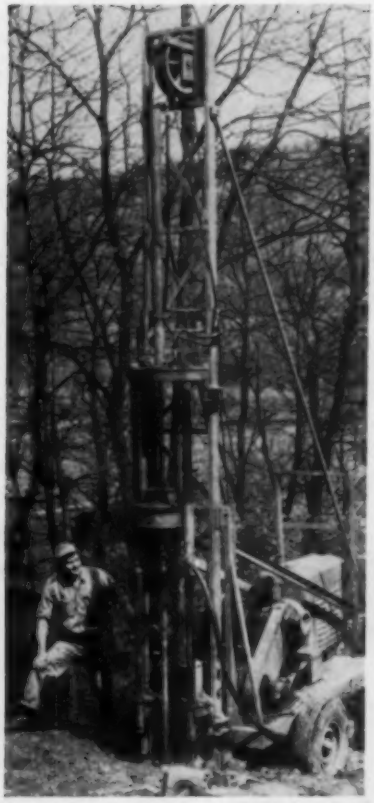
Drilling a 9 foot hole every 30 seconds in bad seams is standard for this 35 lb. coal drill. Long auger lengths are easy to handle. Its high torque motor packs the power for hard drilling . . . responds instantly. 1000 RPM auger speed holds vibration to a minimum.

Run the CP-35-HCD from the power system of cutting, timbering or roof bolting machines. Absolutely safe . . . no sparks or shock . . . no kick on stall! For details, write: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

ACCESSORIES INCLUDE: **Valves, gauges, junction blocks, hoses and fittings**

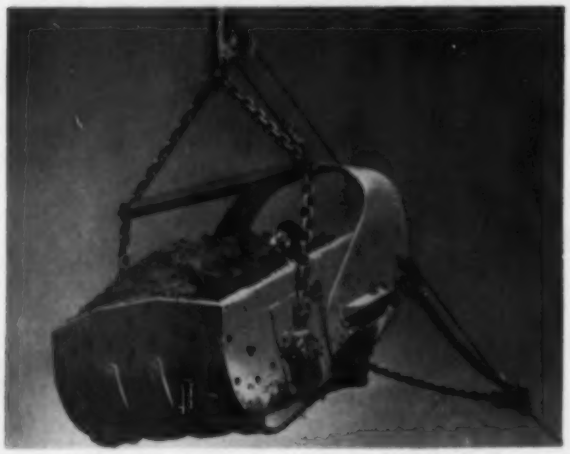
Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



Drill Augers, Drives, Cores

The Testborer, a drill developed by the Penndrill Mfg. Div., Pennsylvania Drilling Co., 1201 Chartiers Ave., Pittsburgh 20, Pa., is a combination auger, driver and corer. Its manufacturer says the unit will auger to 150 ft, automatically drive pipe and casing to 150 ft, drive soil samplers with an exact 30-in free-fall hammer blow, and core drill to 500 ft. A trailer-mounted drill, the Testborer has a 6-ft hydraulic feed, a four-speed rotary unit, a four-speed hoist, an integral 19-ft derrick, and an automatic driving mechanism.

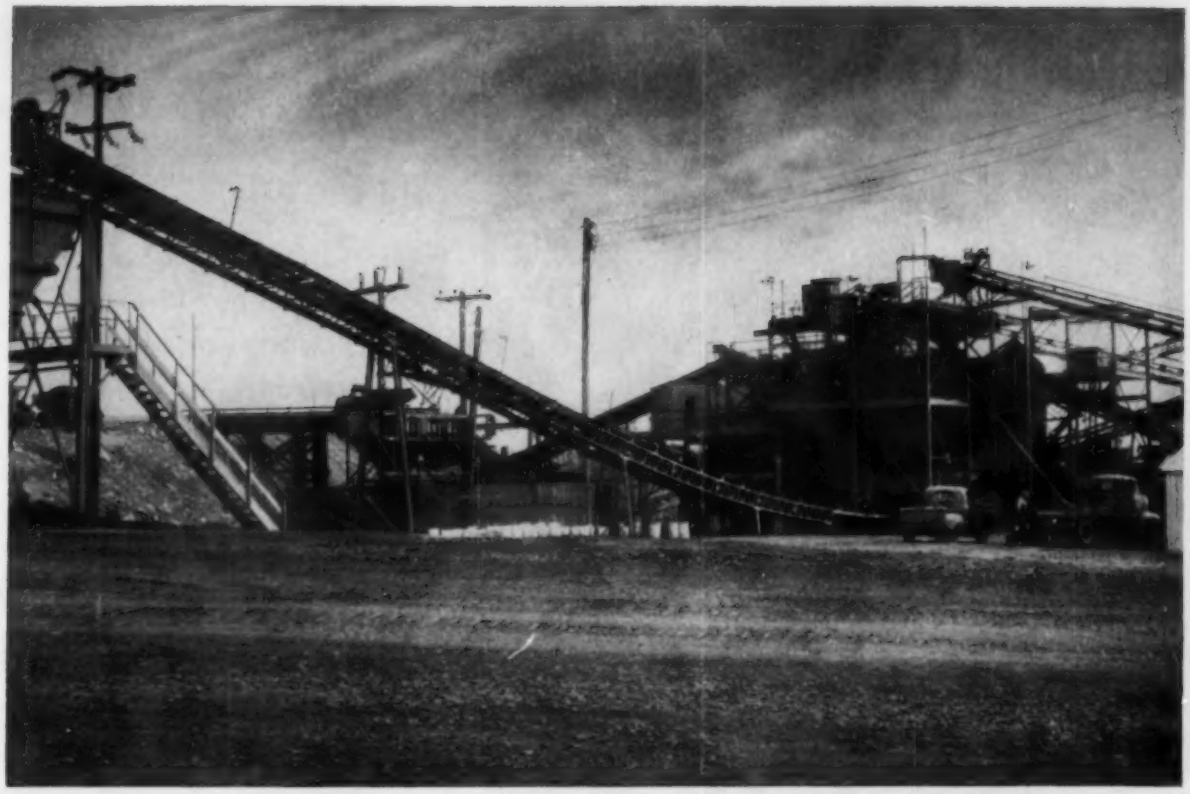


Dragline Bucket Cost, Weight Down

Lighter weight, automatic digging action, and rugged construction are featured in a new line of lower cost "A" series automatic dragline buckets introduced by Page Engineering Co., Clearing Post Office, Chicago 38, Ill. Other features advanced by the company: a heavier, one piece bottom plate; a new, improved lip; a two-position hitchplate; a smooth action dump block; flared sides; forward arch; and reversible tooth points. The "A" series, says Page, is being made in light-medium general purpose, and heavy duty classes. In all, the line comprises 33 buckets.

Locomotives Designed With Cab in Front

Medium duty switching locomotives designed with the cab in front have been introduced by the Plymouth Locomotive Works, Plymouth, Ohio. The units are offered in the 25- to 40-ton weight range, and can be equipped with either four- or six-wheel drives. The new cab design permits an operator almost unobstructed vision, including to the front of the coupler. Air tanks and other equipment, usually mounted outside are enclosed within the cab. Yet, says the maker, the equipment is fully accessible. Named Plymouth "Torquomotive," the locomotives transmit power from the engine to wheels through a hydraulic torque-converter coupled to a Plymouth



132 PIECES TO LUBRICATE...

11 Cities Service Lubricants do job!

Located at the eastern end of the great Mesabi Range, the beneficiation plant of the W. S. Moore Company is made up of 132 individual pieces of equipment.

In itself, that makes a formidable lubrication job . . . but added to that is the fact that much of this equipment must constantly be exposed to the weather.

Corrosion, oxidation and rust could reap costly damage . . . but instead they're licked!

How? Through the use of a detailed lubrication survey and frequency application chart prepared with the assistance and cooperation of Cities Service Lubrication Engineer James Levine!

Result: all 132 pieces of Moore's equipment are lubricated by eleven Cities Service Lubricants . . . and there's never been a lubrication failure!

Perhaps a Cities Service Lubrication Engineer can help simplify and improve your lubrication picture, too. It costs nothing but a telephone call to your nearest Cities Service office to bring him over. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

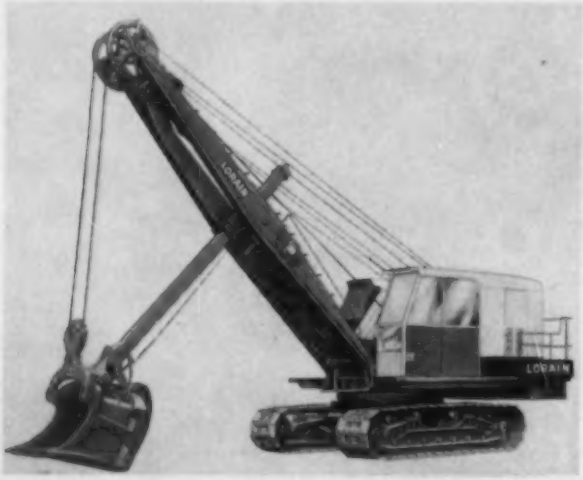
WHAT THE CITIES SERVICE LUBRICATION ENGINEER RECOMMENDED

EQUIPMENT	LUBRICANT
Gear reduction sets	Pacemaker #3 and #5
Screen and feeders' gear boxes	Trojan L-2 and L-4 compounds
Electric motors, conveyor bearings	Trojan H-1 and H-2 grease
Compressors	DC 915 compressor oil
Jaw and gyratory crushers	Trojan MP 90 and 140 gear oil
Open gears	Cisco 3Z
Jaw crusher	Trojan F-3-0

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

transmission. This is said to permit smooth transmission of power, plus maximum power without excessive wheel slippage. Plymouth is offering the locomotives with a choice of diesels.



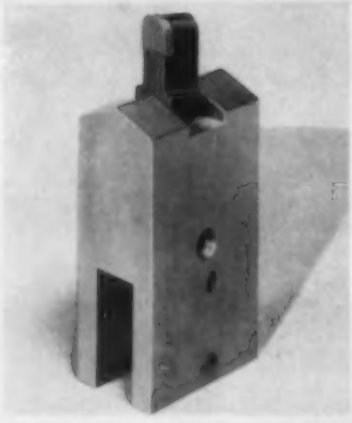
2½-Yd Shovel Crane

Field research and interviews with shovel operators has resulted in the Thew Shovel Co., Lorain, Ohio, building the Lorain-85A, a 2½-yd shovel-crane whose chief new feature is a modern cab. The new cab has increased glass area for improved visibility, a sliding overhead sunshade and windows, and wider inside space. Mechanical features are tried Lorain design—e.g. two-lever, "Joy-Stick" metered-air controls and "Shear Ball" mounting. The "Joy-Stick" controls all turntable operations and the "Shear Ball" mounting eliminates turntable rollers, a center pin and nut. Two crawlers are available with the 85A, a 15-ft, 6-in x 11-ft, 10-in-wide model that develops up to 48 tons lifting capacity, and an 18-ft, 6 in x 13-ft wide model that develops up to 60 tons. Both deliver two speeds in forward or reverse. The 85A is also convertible to crane, shovel, clamshell, dragline, and hoe.

Two Heavy Duty Trucks Introduced

Two heavy-duty, all-wheel-drive models have been added to the International truck line. The new trucks, the R-190 (4x4) and the RF-190 (6x6), complete a lineup of all-wheel-drive Internationals that range in gross vehicle weight ratings from 7,000 to 43,000 lb. Model R-190 is rated at 29,000 lb, gvw, and is available in four wheelbases from 142 to 190 in. Model RF-190 is available with a choice of bodies to provide gvw ratings of 38,000 or 43,000 lb. A choice of three gasoline and three LPG-powered engines are available for each model. High altitude pistons are standard in LPG engines.

Other features noted by the manufacturer include a new front-axle design for better stability and minimum increase in front-end height; low rear-end loading height; and frame reinforcements forward beyond front spring mountings for additional front-end strength and rigidity.



Bits, Block Holders

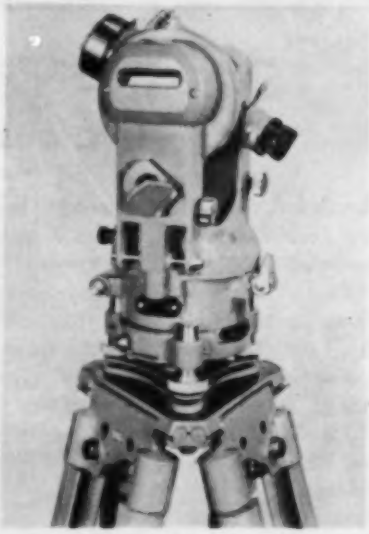
New carbide-tipped bits and special block holders that reportedly increase the efficiency of barrel-type coal recovery auger heads have been announced by the Austin Powder Co., Cleveland 13, Ohio. Designed with tapered shanks, the bits drive-fit into the conical holding devices of the blocks. When cutting pressure is exerted, the bits become firmly seated. Because no lugs are required, vibration, chattering and shank-breakage are said to be virtually eliminated. According to Austin, all 21 bits on the outer cutting circumference of a 42-in machine can be changed in approximately 3 min using only a hammer and a punch. Block holders have four Allen head screws to permit accurate positioning on the drill head prior to welding. This is said to provide constant and equal distribution of the total load on each bit.

Multi-Purpose Grease

A multi-purpose, lithium-based grease engineered to meet nearly all industrial lubrication requirements is being produced by the Gulf Oil Corp., Pittsburgh 30, Pa. The new product, Gulfcrown, is designed to provide lubrication under conditions which often require a variety of special greases, e.g. high and low temperatures, water action, high-speed bearing action, and long storage.

German Mining Equipment

Kurt Orban Co., Inc., 22 West Putnam Ave., Greenwich, Conn., announces that it is now the exclusive United States distributor for products of Demag Aktiengesellschaft Duisburg and its subsidiaries, Duisburg, Germany. For the mining industry these products include: air compressors, air turbine motors, bulldozers, angle dozers, carbide drilling equipment, cages and caging equipment, cranes and transporters, refuse handling equipment, diesel locomotives, flight conveyors, hammer drills, haulage gear and hoists, loaders, mine ventilating fans, mine car feeder systems, pithead frames and buildings, rock drill sharpening and upsetting machines, rope attachments, rotary deep-well drilling plants, rubber belt conveyors, scraper installations, steel plate conveyors, track shifters, wheel excavators, winding engines (including Koepe systems), rubber-tired guide rollers for mines and ships, and head sheaves. The Kurt Orban organization also distributor for "Union" steel pit props and articulated steel bars produced by Eisenwerk Wanheim.



Optical Transit

Wild Heerbrug Instruments, Inc., Main & Cover Sts., Port Washington, N.Y., reports that it has initiated a number of new design concepts in the Wild T-16 optical transit. The instrument is reportedly designed for ease and speed of operation. Circles are read at a glance to 1 min directly, to 20-sec by interpolation. A built-in repeating clamp is used for setting on zero and eliminates lower plate motions. A new optical plummet providing an upright image has also been designed for the T-16. Optional attachments include a battery light for circle readings; horizontal and collimation level vials; and telescope reticle.

ROEPRENE Mining Cables are approved by the Pennsylvania Bureau of Mines. Approval P-111, and comply with the requirements of the U. S. Bureau of Mines for flame resistance. Roeprene Parallel Trailing Cables are also available as Type "W" without ground wire.

THIS TWIN GETS NO PERMANENT WAVE

Rugged sheath on Roeprene® Parallel Twin Mining Machine Cable won't "sleeve." Unique ground wire is formed by braiding, for longest life.

The construction of Roeprene Parallel Twin Mining Cable tells its own life story. And it's a *long* life story. See how the sheath surrounds and grips the conductor insulation. This feature prevents "sleeving"—waves and wrinkles don't form in the outer sheath. Conductors are locked fast, can't slip.

Look, too, at Roebling's unique grounding conductor. It's braided and eased into shape from fine, annealed copper wire, not made of bunched wire forced into shape with flattening rolls... no nicked or crushed wires to cause trouble later. And this grounding conductor has a braided green cotton covering which strips clean to make splicing and terminating easier. It also permits the grounding conductor to move within the sleeve when the cable is fixed. Result—the power conductors absorb the tensile load.

And these other features, too: Heat- and moisture-resistant GRS insulation around each power conductor... a sheath of tough, oil- and moisture-resistant, flame-retardant Neoprene... and a combination of properties—including a great number of finer power conductor wires—which add up to extra flexibility, permitting a smaller bending radius.

Write or call your local Roebling Sales Office for more of the reasons why Roeprene Parallel Twin Mining Cable is the most economical cable you can buy.

ROEBLING

John A. Roebling's Sons Corporation, Trenton 2, N. J.
Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

MORRIS *meets the CHALLENGE of INDUSTRY'S NEW FRONTIERS*

No Matter What Your Present or Future Heavy Pumping Problems Are . . . Morris Can Satisfy You NOW!

The new Morris Type RX Slurry Pump is specifically engineered to handle the viscosities, densities and special characteristics of the slurries and sludges developing from industry's ever-advancing products. It is engineering attuned to the future . . . designed to meet the demands of a towering tomorrow.

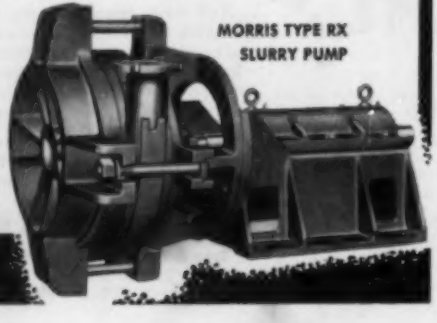
Rugged, Dependable, Trouble-Free; Operates With Minimum Attention . . . Cuts Maintenance Costs!

The new Morris RX is designed for performance perfection under all conditions, including heavy, coarse, fine slurries, dispersions and sludges. Operates at low speeds; quickly dismantled for inspection, avoiding lengthy lay-up time.

MORRIS MACHINE WORKS

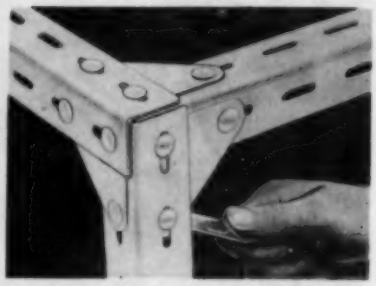
Baldwinsville, N. Y. *Sales Offices in Principal Cities*

FREE SERVICE: Morris engineers will gladly recommend the custom-made pump best suited to your needs. Send necessary data today.



MORRIS TYPE RX SLURRY PUMP

MORRIS CENTRIFUGAL PUMPS

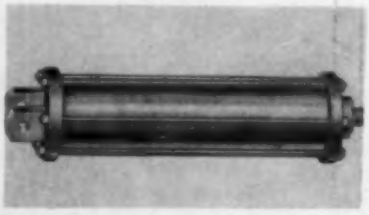


Basic Building Component

Slotted angle steel with a tensile strength of 32 psi is being sold by the Handy Angle Div., Lug-All Co., Haverford, Pa. as a basic material for building your own equipment. The company has designed the material with a patented anchor plate, which is said to provide rigidity to all structures and to eliminate corner bracing. Square-necked bolts with mushroom heads provide snag-free surfaces. Lug-All suggests that buyers can build their own benches, shelves, switchgear frames, machine guards, dollies, control panels, conveyor stands, motor stands, and partitioning.

New Lubricant Type

The development of "Molykote" Type GX, a molybdenum disulfide lubricant with a strong affinity for bonding to metal without excessive surface buildup, has been announced by the Alpha Molykote Corp., Stamford, Conn. Type GX is a refinement of "Molykote" Type G, a molybdenum disulfide lubricant made by Alpha Molykote for a number of years. In Type GX the particle size of molybdenum disulfide has been reduced, thus achieving an increase in its total surface area. The decrease in particle size means more molybdenum disulfide in contact with the metal being lubricated and, at the same time, a reduction in solid content to reduce excessive surface accumulation.



Air Cylinders

Densmore Engineering Co., Inc., 235 E. Greenleaf St., Compton, Cal., announces that its newest Densmore air cylinders are designed and built to provide longer life under severe conditions. In addition, the company says, the cylinders will facilitate maintenance since they can be serviced with simple tools. Densmore points out that the cylinders' alloy steel is designed for heavy duty. Other features: a long rod guide, independently adjustable "V" rod packing;

cut bearing maintenance . . . with one lubricant

Nebula EP – another first for Esso Research – is a multi-purpose grease that *out-performs* all other multi-purpose greases. And many specialized greases as well!

Nebula EP works exceptionally well in ball, tapered roller and roller bearings – of *all sizes* from rolling mills to precision instruments.

Nebula EP stands up under extreme heat. It retains its lubricating qualities at high temperatures at which many special heat-resistant greases would have broken down.

And Nebula EP has exceptional water-resistant and rust-preventive properties – an important consideration where water is a factor. What's more, Nebula EP is formulated with a true soap which gives it extra anti-wear and load-carrying characteristics – for an extra margin of protection. High oxidation stability gives Nebula EP longer life in storage and in use.

Nebula EP can be applied by *any* of the conventional methods. Get the whole story about this fine product . . . from your nearest Esso Standard Oil Company Division Office: Boston; Pelham, N. Y.; Elizabeth, N. J.; Bala-Cynwyd, Pa.; Baltimore; Richmond; Charlotte; Columbia, S. C.; Memphis; New Orleans.

FOR BETTER RESULTS

NEBULA EP

Esso

PETROLEUM PRODUCTS

Happy Event!

The SuperDuty® Table Has Twins

Exhibited at the Coal Show for the first time anywhere, the new CONCENCO® "77" DIAGONAL-DECK® Coal Table has a washing capacity exactly double that of the above illustrated SuperDuty older #7 table.

The revolutionary new construction not only has two identical decks operating in unison from one head motion, but cable suspension of the decks virtually eliminates impact to the building, thus permitting smaller, lighter housing structures that materially reduce new plant cost.

Already proven by months of 3 shift operation, the "77" carries exactly the same mechanical and operating guarantees that cover the almost universally employed SuperDuty No 7 Table. Send for Bulletin.

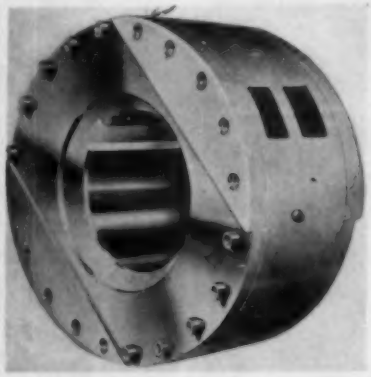
See the New
CONCENCO "77" DIAGONAL-DECK
Coal Washing Table
at
American Mining Congress
COAL SHOW
BOOTH No. 2110

THE DEISTER ★
CONCENTRATOR
COMPANY
903 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Est. 1906*

Equipment News *(Continued)*

a bronze rod wiper ring to prevent foreign material from entering the cylinder. Operating pressures are 150 psi on air, 500 psi in hydraulic service. A six-tie rod cage protects the cylinder barrel in rough service. Densmore makes the cylinders with strokes up to 18 ft, from 3-in through 8-in bores, and with a wide choice of piston rod sizes.



Back-Stop Clutches

Formsprag Co., Van Dyke, Mich., has introduced a new line of over-running, large bore backstop clutches in six sizes. Designated Models FS-1100, FS-1150, FS-1200, FS-1250, FS-1300 and FS-1400, he units are said to combine the advantages of compact size and lighter weight with greatly increased torque capacities. Designed primarily as backstops, the clutches are normally installed on the headshafts of large conveyor systems. Other recommended applications: backstops for elevators and as dual drives for stand-by power applications. All models are made in maximum-bore sizes from 6 to 12 in, with torque capacities from 18,500 to 136,500 ft-lb. All have sprags individually energized by pairs of springs, ball-bearing construction, mechanicals seals, and grease lubrication. Address: Application Engineering Dept., Formsprag Co, 23601 Hoover Rd., Van Dyke, Mich.

Bituminous Fields Map

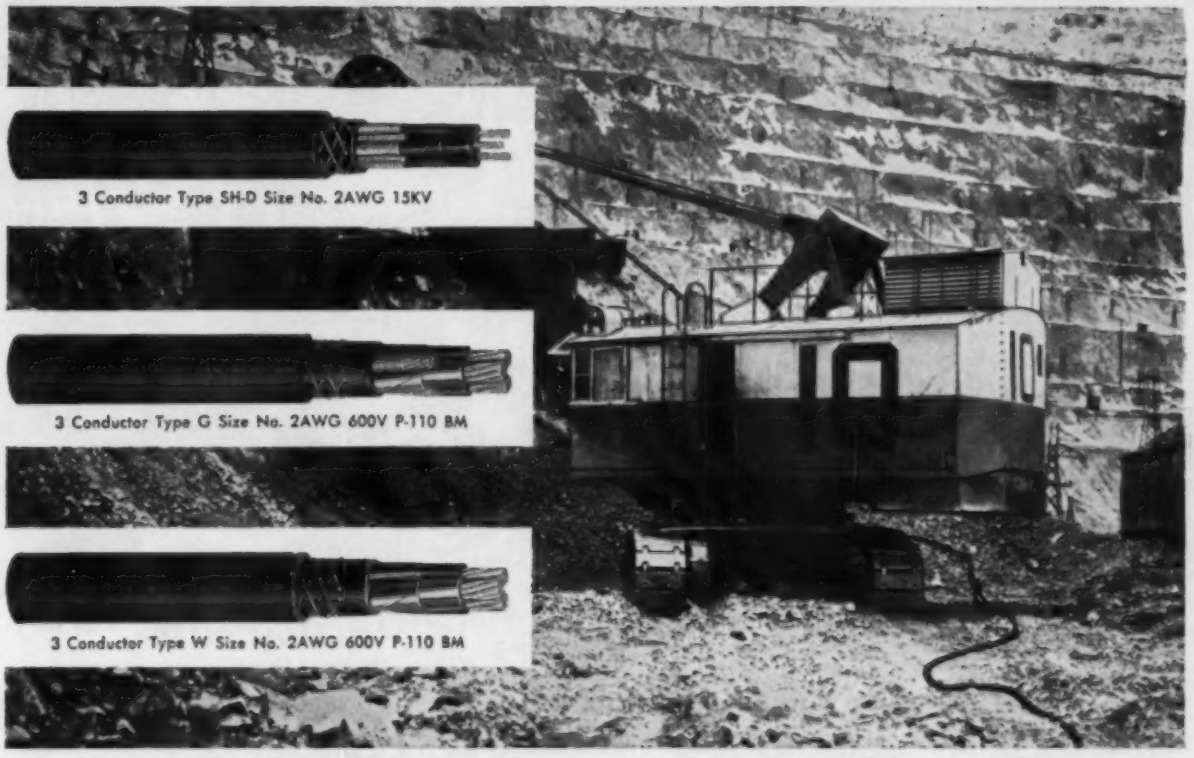
A revised map of the bituminous coal fields of Indiana, Illinois and West Kentucky has been published by the Paul Weir Co., Inc., 20 No. Wacker Drive, Chicago 6, Ill. The map lists rail and river shipping mines active in January, 1957, and shows the locations of mines, freight origin groups, principal cities, counties, railroads, rivers, and other inland waterways.

Cement Leak Stopper

A liquid additive named "Flextite" is said to make a fast-acting leak stopper out of ordinary cement. The additive is manufactured by the Building Maintenance Div., Flexrock Co., 3601-I Filbert St., Philadelphia 1, Pa. By regulating the setting time of Portland cement, "Flextite," according to its manufacturer,

GENERAL CABLE SUPER SERVICE

PORTABLE POWER and MINING CABLE


3 Conductor Type SH-D Size No. 2AWG 15KV
3 Conductor Type G Size No. 2AWG 600V P-110 BM
3 Conductor Type W Size No. 2AWG 600V P-110 BM

with SUPERTUF Jacket

GENERAL CABLE offers a complete line of SUPER SERVICE portable power and mining cables which will stand up under the most severe operating conditions and furnish longer life and reliable service no matter how difficult the application.

All SUPER SERVICE cables are jacketed with an extra heavy duty, vulcanized in mold, double layer cord reinforced "SUPERTUF" neoprene sheath with maximum resistance to tearing, cutting, abrasion and overall mechanical abuse, and possessing outstanding resistance to water, oil, acids, alkalis, flame and effects of sunlight and weathering.

SUPERTUF neoprene jacket far exceeds the requirements of ASTM D-752, and all 600 volt SUPER SERVICE portable cables bear the official approval number P-110 BM embossed in the jacket indicating compliance with the flame resistance requirements of the Pennsylvania Department of Mines and requirements of the Federal Bureau of Mines.

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, New York
Offices and Distribution Centers Coast-to-Coast

for quality and service . . . **specify GENERAL CABLE**

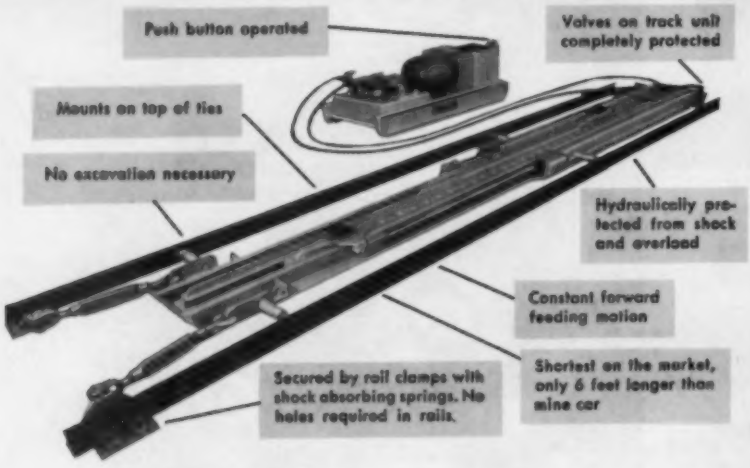
Equipment News (*Continued*)

makes it possible to stop direct leaks almost instantly. The additive works well on concrete, masonry, and brick surfaces, says Flexrock.

Pocket-Size Receiver

RCA Commercial Electronic Products has announced what it says is the first commercial pocket-size frequency modulation (FM) radio receiver for mobile communication. Fully transistorized, the 10-oz instrument is designed to provide extensions of several miles for radio systems now operating on the 150-megacycle band. Research on instruments for other radio bands is underway in RCA labs, according to the company. The new receiver is a single channel device designed for operation on any frequency in the 148- to 174-megacycle band, commonly known as the 150-band. Its circuitry is printed and the instrument contains its own antenna and loudspeaker. It can be contacted directly by a sending station without the need of additional equipment.

NOLAN Porta-Feeder

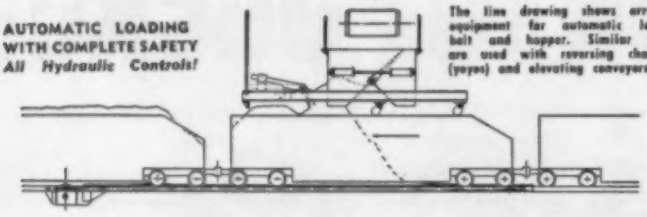

Push button operated
Valves on track unit completely protected
Mounts on top of ties
No excavation necessary
Hydraulically protected from shock and overload
Constant forward feeding motion
Shortest on the market, only 6 feet longer than mine car
Secured by roll clamps with shock absorbing springs. No holes required in rails.

The only COMPLETE line of car-spotting and car-loading equipment available

Two NOLAN Porta-Feeder models will help you meet every requirement and condition in spotting cars for loading: 1. Direct Mechanical Drive, 2. Hydraulic Cylinder Type, Hose Coupled to Remote Power Unit (shown above).

There are hundreds of NOLAN Feeders in operation. There are some in your vicinity—ask us to show you how efficient NOLAN equipment can be in your operation.

AUTOMATIC LOADING WITH COMPLETE SAFETY *All Hydraulic Controls!*

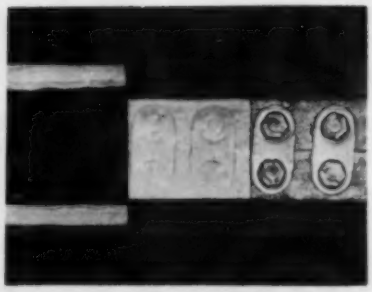


The line drawing shows arrangement of equipment for automatic loading from belt and hopper. Similar arrangements are used with reversing chain conveyors (yoyos) and elevating conveyors.

NOLAN SALES AGENTS:
- George C. Hutchinson, Jr., 1304 Koonan Building, Pittsburgh, Pa.
- Huntington Supply & Equipment Co., Huntington Nat'l Bank Bldg., Huntington, W. Va.
- John Lloyd & Sons, 33 Bennett Bldg., Wilkes-Barre, Pa.
- E. C. Horne Machinery Co., 1726 Champa Street, Denver 2, Colorado
- Frank C. Mammett, P.O. Box 154, Castle Gate, Utah
- Amos A. Culp, 429 South 24th Street, Birmingham 5, Alabama
- John North Associates, P.O. Box 105, Harbert, Mich. (Chicago District)

THE NOLAN COMPANY

106 Pennsylvania Street • Bowerston, Ohio



Belt Splice Protection

"Rema," a self-vulcanizing rubber repair material being manufactured by the Flexible Steel Lacing Co., is designed to protect conveyor belt splices made with Flexco fasteners. Two methods of repair are recommended by the maker. In one the fasteners are recessed in a belt, then covered with "Rema" surface strips (photo). In the other method both ends of the belt are sealed with "Rema" red filler sheeting before applying fasteners. In the first method the result is a smooth belt surface that has sealed out moisture. The result of the second method is an effective way of minimizing deterioration of belt ends, according to the manufacturer. Address: Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill.

Electrode Holder

"Tong-Grip," an electrode holder manufactured by Martin Wells, Inc., delivers 300 amp on a heavy duty cycle when connected to 00 cable. Weighing 17 oz, the holder is made of only nine parts, and can be assembled or disassembled by hand in a few seconds. Features: all glass insulators and spring cup; patented slip-on insulators; no screws or rivets. The "Tong-Grip" is designed with a hinge pin and upper tong that carry no current. Address: 5886 Compton Ave., Los Angeles 1, Cal.

Petroleum Products Service

A comprehensive, cost-free service providing practical assistance in problems involving fuels, lubricants, and other petroleum products is being initiated for industrial and commercial users of Gulf Oil Corp. petroleum products. The goal of the program, named the Gulf Petro-engineering Service, is to bring the engineering and research facilities of Gulf to problems relating to the use of petroleum products. Some 1,300 scientists, engineers, metallurgists and chemists will be used in the program, according to Gulf. Some of the services: maximum

Stemming material delivered by 2¼-yd. Michigan 175A

Commutes 2 miles between Arizona pits . . .

Versatile Michigan pays for itself on a multitude of open pit jobs

This 2¼-yd. Michigan Tractor Shovel works at one of the biggest open pit copper mines in Arizona. At this location two pits are being mined: one a 4000 x 6000 pit up to 600-ft. deep; the other a new cut two miles away. Between these pits, the 27-mph Michigan commutes on its own power to handle a multitude of jobs.

Cleans up excess ore

Prior to blasting, the Michigan cleans up excess ore around the toes of the benches. It takes less than two minutes to put a heaping load into a 6-yd. dump truck. This efficient clean-up job makes for fuller breakout of material when blasting.

Delivers stemming material

No matter how hard the drillers try to dispose of the mud from the churn-type blast hole drills, trucks are often unable to get through to deliver stemming material. The 4-wheel drive Michigan easily works through the mud, delivers loads of stemming material to the powder loading points to keep shots on schedule.

Cleans up around shovels

When the crawler bulldozers come off the mine floor for repairs, the 133-hp Michigan does the clean-up work around the power shovels. Working on a new addition to the concentrating plant, the Michigan handles sand, aggregate and cement at the concrete plant. The Michigan also built a baseball diamond and part of an air strip by hauling and spreading the necessary material. Its big rubber tires even did the compacting!

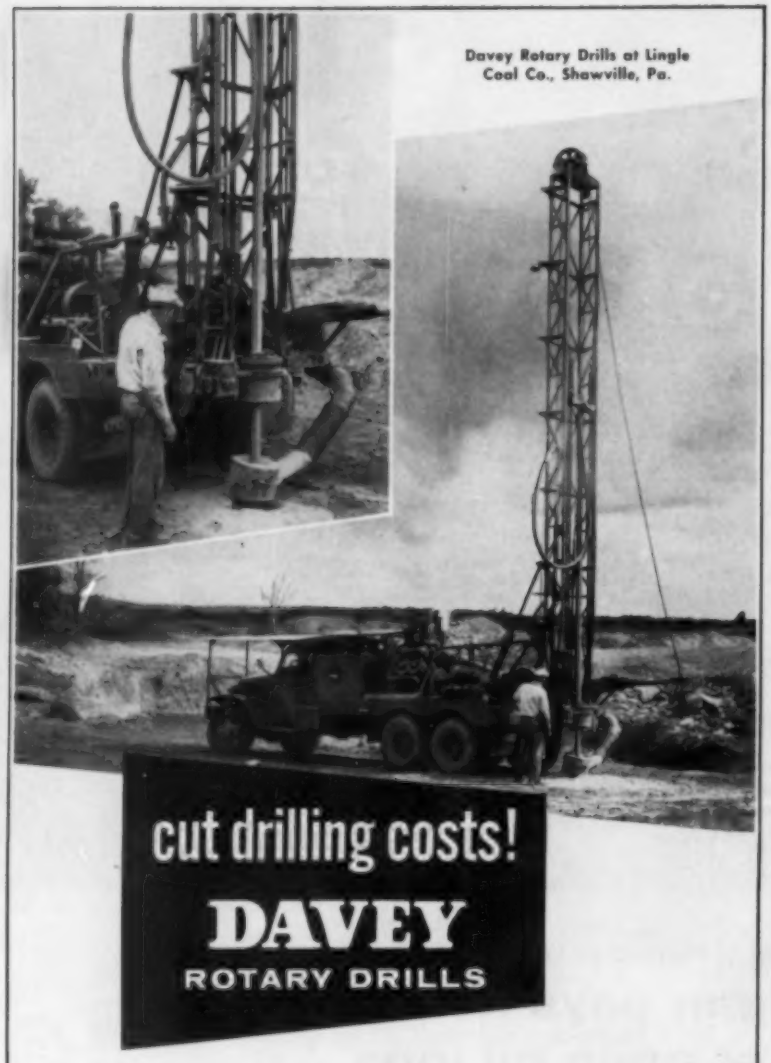
A versatile work horse

With Clark torque converter, power-shift transmission and planetary-wheel axles, the Michigan Tractor Shovel delivers *more useable power and traction than you've ever seen on this type of machine.* It will handle amazingly heavy jobs—in addition to the routine assignments which affect the performance of the more expensive equipment, like power shovels, drills and rolling stock. For proof that the Michigan is in a class by itself, ask for an on-the-job demonstration. *You name the job.*

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2473 Pipestone Road
Benton Harbor 23, Michigan

Michigan is a registered trade mark of

CLARK® EQUIPMENT



For faster, more economical drilling . . . increased coal production at lower costs, leading strip operators rely on Davey. Suitable for mounting on any make of truck, Davey Rotary Drills move fast between blast holes . . . are ideal for low cost core drilling with air . . . easy to set in drilling position.

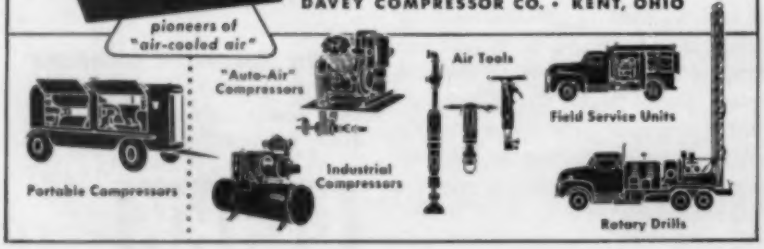
Daveys are available in 6 different models—air blast, mud pump, or combination types. Rated capacities to 2,000 ft. Outstanding features include choice of power take-off or separate power unit operation, automatic hydraulic feed, hydraulic pull down, heavy-duty rotary table, rugged tubular box-type mast . . . AA-1697

Write for full details!

DAVEY

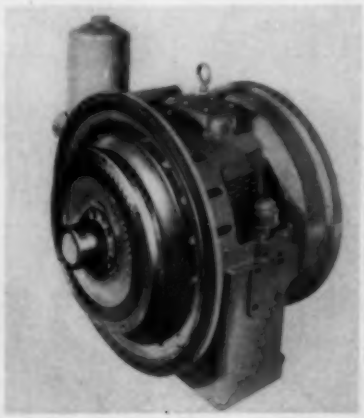
pioneers of "air-cooled air"

DAVEY COMPRESSOR CO. • KENT, OHIO



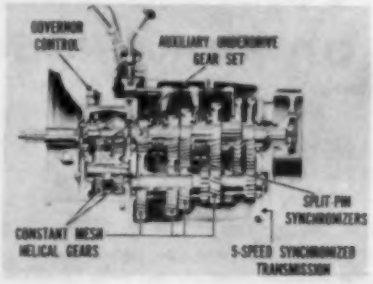
Equipment News (*Continued*)

fuel economy through counsel on proper engine-tune-up procedures; maximum heat or power from each gallon of fuel oil; reduction of the number and variety of lubricants used; controlling dust on plant grounds.



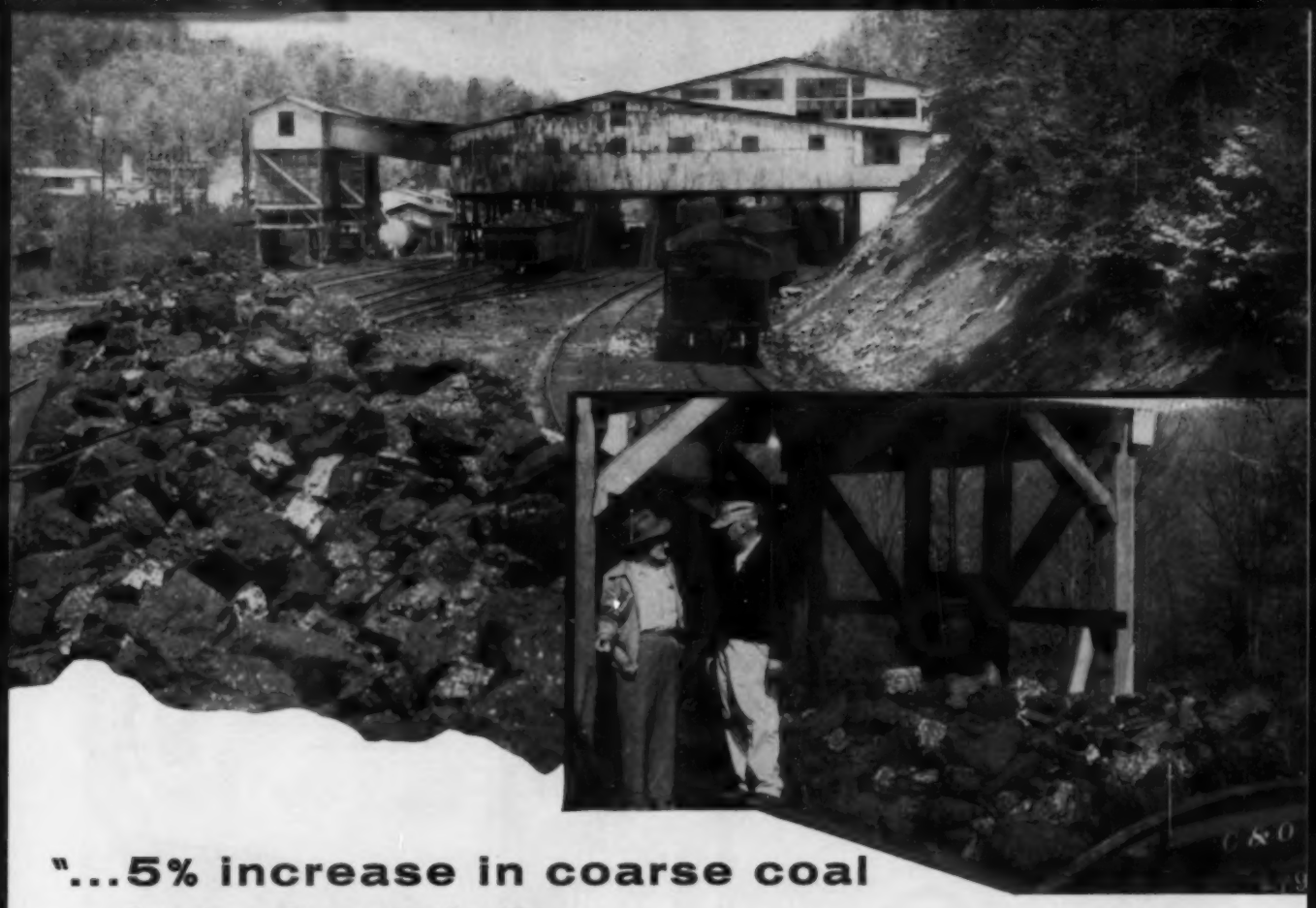
Torque Converter

The Twin Disc Clutch Co., Hydraulic Div., Rockford, Ill., has introduced the 1300 Series single-stage torque converter, a unit designed for high-speed diesel and gasoline engines. Twin-Disc recommends the converter for use in shovels, front-end loaders, hoisting machinery, road rollers, and graders. The unit is designed for engines producing from 30 hp at 1,450 rpm to 212 hp at 3,200 rpm. Specific torque ratings are 165, 200, 240, 285 and 330 lb-ft, depending on the impeller blading selected by a user. Maximum input torque is 350 lb-ft.



Truck Transmission

For transmission requirements of highway trucks, Clark Equipment Co., Falahee Rd., Jackson, Mich., has developed the "StepMatic," a semi-automatic heavy duty truck transmission. Said to minimize shift lever and clutch pedal manipulation, the transmission is an integrated combination of a five-speed synchronized transmission and an auxiliary gear train. The auxiliary unit is composed of a direct and an underdrive gear set which is semi-automatically engaged. The underdrive gear ratio "splits" the geared steps of the transmission. The result is ten closely spaced gear ratios. Regardless of the transmission gear in use, a driver



"...5% increase in coarse coal ...less degradation with AIRDOX"

NON-EXPLOSIVE MINING METHOD

AIRDOX

NON-EXPLOSIVE MINING METHOD

Cuts Costs 5 Ways

- Produces less fines in face preparation
- Rolls coal forward for faster, easier loading
- Easier on "tender" roofs—cuts timbering, bolting
- Lowers cleaning costs by minimizing fines
- Reduces degradation—no shattered coal

NEW RIVER IMPERIAL SMOKELESS

states J. G. McCURRY
General Manager
Imperial Smokeless Coal Company

"We have been using the Airdox method of mining for some five years now in all our deep mines. We gave it a very thorough test period and compared the results with other methods of blasting. Airdox gave us an increase of more than 5% in coarse coal. Moreover, our customers report there is *noticeably less degradation* of coarse coal when unloaded at its destination.

"We have a new mine opening this fall and expect to stay 100 per cent on Airdox."

GET ALL THE FACTS • WRITE FOR FREE SURVEY

CARDOX CORPORATION • 307 NORTH MICHIGAN AVENUE • CHICAGO 1, ILLINOIS

WAREHOUSES and DISTRICT OFFICES

Harper, West Virginia
Phone: Clifford 3-4812

Benton, Illinois
Phone: Benton 8-3521

St. Clairsville, Ohio
Phone: St. Clairsville 619

Pikeville, Kentucky
Route 2, Box 99
Phone: Robinson Creek 5

Louisville, Colorado
Phone: Boulder
Hillcrest 2-7290

Library, Pennsylvania
Box 427
Phone: Library Tennyson 5-6910

Camden-on-Gauley, W. Va.
Phone:
Camden-on-Gauley 2181

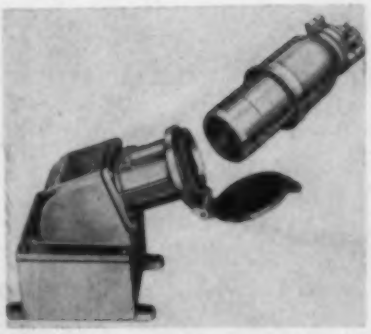
Evansville, Indiana
307 Northwest Fifth St.
Phone: Evansville 2-8944

Ottumwa, Iowa
Phone: Ottumwa
Murray 4-6864

can obtain additional gear reduction and power by "floorboarding" the accelerator or by pushing a dashboard button. This shifts the auxiliary into underdrive and provides additional gear reduction. The auxiliary automatically returns to direct drive when the accelerator is relaxed.

AC-DC Welders

Two AC-DC welders, a 180-amp unit and a 250-amp unit, have been added to the Idealarc line of welders manufactured by the Lincoln Electric Co., Cleveland 17, Ohio. Each machine is designed to operate either as an AC transformer type welder or as a DC rectifier type. A switch on the units' front panels change welding operations from AC to DC positive or to DC negative. Thus, the use of all types of manual electrodes is possible. Lincoln Electric says, however, that it also is making both welders as straight AC machines. Each operates on single phase, 230-v AC input power. Lincoln points out that most DC welders require three-phase power. NEMA ratings: 180 amp, 25 v, 20% duty cycle; 250 amp 30 v, 30% duty cycle.



Overload No Bar to Safety

A line of receptacles, plugs, and connectors, which are said to be safe even when subjected to 50% greater than rated loads, is being produced by Russell & Stoll Co., Inc., 125 Barclay St., New York 7, N.Y. Named "Saf-T-Arc," the line is manufactured with deep, insulating chambers designed to confine and snuff out arcing and flashover. All devices are polarized. Thus, plugs will fit only into receptacles or connectors having the same electrical components. The units are made of cast aluminum alloy housings and enclosures, and in 30, 60, 100, and 200 amp, 600 v AC, 250 v AC or DC.

Metal Brake Blocks

A line of all-metal brake blocks designed to meet the unusual braking requirements of heavy duty, inter-mountain motor transports and off-highway equipment is being produced by the S. K. Wellman Co., Bedford, Ohio. Made from powdered ferrous metals and wear-controlling refractory elements, the block reportedly shows no fade on either high speed stops or continuous down hill braking. Moisture and grease do not affect it, the company says, adding that fewer adjustments are required.

Air Drill Hose

Hewitt-Robins Inc., Stamford, Conn. has developed a new hose for pneumatic drills used in heavy-duty mining and construction work. Reportedly light, yet tough and flexible, the hose is being marketed under the name Duroil air drill hose. It is made with a Buna N tube (for resistance to oil and oil vapors), and a braided rayon cord carcass designed not to contract or stretch under working

So We TOOK THE PARTS BACK!

That's about all we could do when our distributor told us that ONLY 3 items were sold over a 3-month period!

PROOF AGAIN that Stamler Equipment operates at NEGLIGIBLE REPAIR COST!

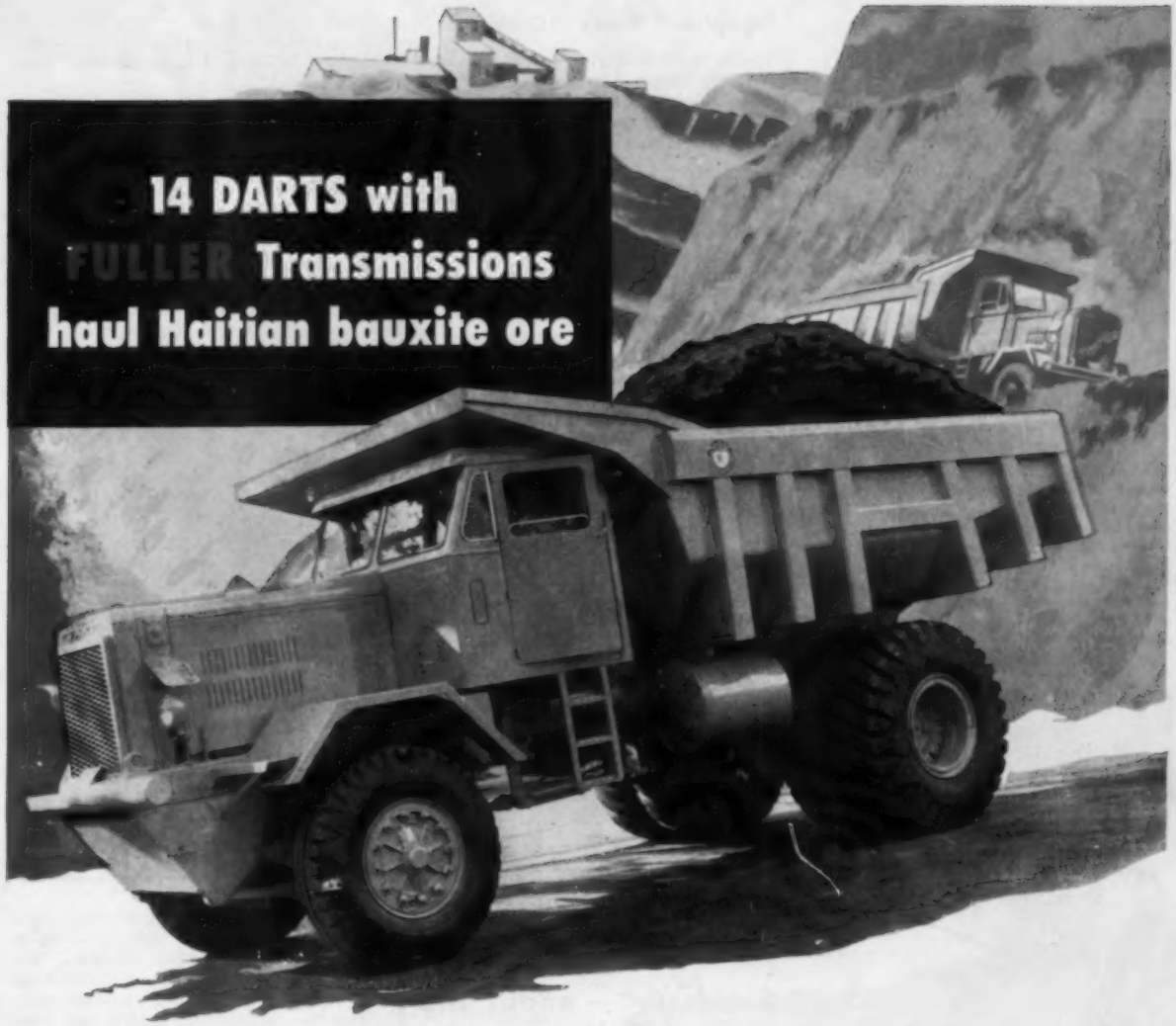
JUST recently one of our distributors made a check of their repair parts inventory and found — as they put it — "that our stock of materials for your spotters is not apportioned properly." So they wanted our approval for the return of the parts. There were 53 items on the list and during a 3-month period they had received orders for only 3 of the items! This bears out what we've been telling you for a long time. It is proof again that you can mine coal faster, more efficiently and more economically with STAMLER Car Spotters; that STAMLER'S hydraulic construction gives trouble-free service with negligible repair cost! When are YOU going to consider STAMLER Equipment for your mines?

STAMLER Hydraulic CAR SPOTTERS

SCHROEDER BROS., Exclusive Eastern Sales Agent Pittsburgh, Pennsylvania
UNION INDUSTRIAL CORP., Carlsbad, New Mexico

W. R. STAMLER CORPORATION
PARIS, KENTUCKY

SALMON & CO., Birmingham, Alabama
WESTERN SALES ENGINEERING CO., Salt Lake City, Utah



14 DARTS with FULLER Transmissions haul Haitian bauxite ore

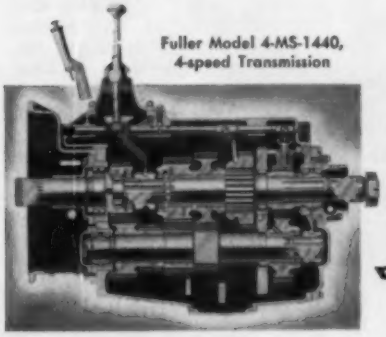
Reynolds Haitian Mines, Inc., Miragoane, Haiti, depends upon 14 Dart 25-ton end dump trucks to carry bauxite ore from mines located on a plateau above Miragoane. Trucks are equipped with Twin Disc Torque Converters and 4-speed Fuller 4-MS-1440 Transmissions.

Downgrades vary from 0 to 11% . . . average 5% on the 8 and 11 mile hauls. The short, easy shifts provided by the Fuller Transmission, and the automatic braking feature of the torque converter, permit easy handling of the loaded (97,000 lbs.) trucks. Speeds are held downgrade to 25 mph *without* use of regular service brakes (a Reynolds' stipulation.)

There is a Fuller Transmission designed with *your* job in mind. More than 110 different models are available, for trucks from 100 to 400 hp, engines from 330 to 1440 cubic inches. Check with your truck manufacturer or dealer for the appropriate Fuller Transmission.

One of Reynolds' 14 new Model 25SL 25-ton Dart Trucks. Twin Disc Torque Converters are matched with Fuller 4-MS-1440 Transmissions.

Fuller Model 4-MS-1440, 4-speed Transmission



really where horsepower goes to work

FULLER MANUFACTURING COMPANY
Transmission Division, Kalamazoo, Michigan

Unit Drop Forge Division, Milwaukee 1, Wisconsin • Shuler Axle Company, Louisville, Kentucky (Subsidiary) • Sales & Service, All Products, Western District Branch, Oakland 6, California and Southwest District Office, Tulsa 3, Oklahoma.

how much has the conveyor carried to NOW?

The MERRICK WEIGHTOMETER gives the answer. While material is smoothly moving along a conveyor, the MERRICK WEIGHTOMETER not only keeps a continuous and accurate record of weights but total weight is available at a glance.
Applied to any size belt conveyor, either horizontal or inclined. The Weightometer gives a simplified and dependable record of your production, without interrupting flow of coal.
Write for Bulletin 851

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J.

Equipment News (*Continued*)

pressures. Its rubber cover is said to have a tensile strength in excess of 2,000 psi. Hewitt-Robins is manufacturing the hose in 500-ft reels, and in diameters of ½ in, ¾ in and 1 in.

Steel-Hardening Compound

"Chromelloy," a steel-hardening compound that hardens from the surface inward, is being introduced by the U.S. Metallurgical Labs., Div. of General Power Services, 381 4th Ave., New York 16, N.Y. Hardening is accomplished by a carburizing, nitriding and alloying effect that often increases tensile strength throughout the steel, according to the company. The hardening process works this way: the steel is heated in a forge or flame, dipped in "Chromelloy" powder, then reheated for about 2 min and quenched. The entire operation is said to require only 5 min.

Radio Tone Squelch System

A two-way radio squelch system for eliminating the transmission of other operators sharing the same channel is being produced by the General Electric Co. Communication Products Dept., Electronics Park, Syracuse, N.Y. Named "Channel Guard," the system provides tone squelch and conventional noise squelch, plus protection against unwanted calls, noise and disruptive interference. Thus, two or more users in the same geographical area can share a channel without listening to messages other than their own.

Equipment Shorts

LENS CLEANING STATION—U. S. Safety Service Co., 1215 McGree St., Kansas City 6, Mo., offers a heavy gauge steel-constructed lens cleaning station containing cleaning fluid dispenser, tissues dispenser and receptacle for used tissues.

MACHINE KEY STOCK BARS—The 7-11 Mak-A-Key kit sold by DeVan-Johnson Co., 500 Rathbone Ave., Aurora, Ill., contains seven machine key bars of different sizes which can be filed to fit eleven different keyways.

SAFETY FLOOR TREADS—Aluminum, anti-slip flooring treads for stair landings and floors are being sold by Wooster Products, Inc., Wooster, Ohio. Named "Safestride," the treads are made with a non-corrosive aluminum alloy base in widths 3 in to 6 in, and are put down in multiple sections to cover any desired area. Any needed length can be ordered. The treads are installed with screws or on masonry with screws and lead expansion shields.

There's no question — about the importance of Roof Bolting today.

HUNDREDS of bolted mines—representing 62% of the 1956 underground coal production—improved their safety records and increased production from 10 to 20% per man resulting in lower labor costs.

Effective bolting calls for thorough knowledge of roof strata—well planned bolting patterns and cycles—proper selection of bolts and shells with an adequate supply and service program. PATTIN Mfg. Company, "The Pioneer In Roof Bolting" offers the most complete line of quality bolting products with an experienced engineering staff for consultation and service. Write or phone us today.

PATTIN
MFG. COMPANY
Marietta Ohio
Est. 1888

Free Bulletins

ARC WELDING—A 24-p electrode data book prepared by the National Cylinder Gas Co., 840 No. Michigan Ave., Chicago 11, Ill., contains information on AWS-ASTM arc welding electrode specifications. In addition readers can learn how to estimate electrode consumption and how to select electrodes. Booklet NH-504.

ROCK BOLTING FILM—"Make Mine Safety" is a 16-mm sound-color film that demonstrates the use of rock bolts in various mine applications. The film was prepared by the Colorado Fuel & Iron Corp., Denver, Colo., and shows the installation and advantages of rock bolts at three mines.

TUBE FITTING—Triple-Lok flare tube fittings are the subject of Catalog 4310 (52-pp) published by the Tube & Hose Fittings Div., Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio. The company's entire line is presented—brass, steel, stainless steel, and aluminum in all shapes.

MOTOR SCRAPER—The Allis-Chalmers TS-360, a 20 cu yd motor scraper, is described with text and photos in Catalog MS-1104. Address: Construction Machinery Div., Milwaukee, Wis.

WIRE ROPE—"The Correct Wire Rope for Contractors' Equipment" is the title

when you put Bowdil Bits

in a Bowdil Chain

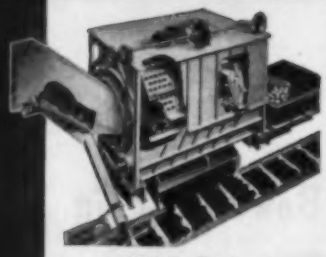
on a Bowdil Bar . . .

you find your greatest economy.

The BOWDIL Company
CANTON 7, OHIO

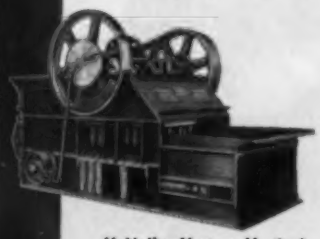
AT THE SHOW, BOOTH 1006

America's most complete line of CRUSHING EQUIPMENT



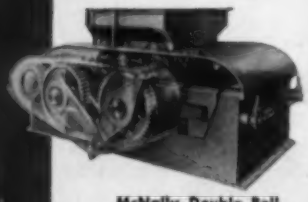
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.



McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

McNally Single Roll Crusher

Universal application 20", 24" and 36" diameter rolls.

AVAILABLE

From Stock and on Short Delivery

For immediate action on complete information write, wire, or call.

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas Wellston, Ohio

Equipment News (*Continued*)

of Brochure 5702, a publication prepared by the Macwhyte Co., Public Relations Dept., Kenosha, Wis. The brochure instructs wire rope users to select on the bases of strength, abrasion and flexibility.

RAIL TRACTOR—Yale Materials Handling Div., Yale & Towne Mfg. Co., is distributing a bulletin on the Rail King Tractor for use with monorail hand and electric hoists up to 3 tons capacity. Address: 11,000 Roosevelt Blvd., Philadelphia 15, Pa.

INDUSTRIAL FILMS—The 18th edition of a catalog describing educational motion picture films produced by United States Steel Corp. is available from the company at 525 William Penn Pl., Pittsburgh 30, Pa. The new edition contains listings of five new films.

CLUTCH PRODUCTS—A 76-p comprehensive manual on automatic freewheeling clutches, combination clutch-couplings, backstops, and a new line of enclosed freewheeling clutch units is being distributed by the Marland One-Way Clutch Co., LaGrange, Ill. As an engineering reference and catalog, the publication explains the Marland clutch operating principle, design features, and construction.

CONVERSION FACTORS CHART—A reference table wall chart for engineers and executives is being distributed by the Precision Equipment Co., 3716 No. Milwaukee Ave., Chicago 41, Ill. Included are common conversions (e.g. inches to centimeters) as well as those more difficult to locate (e.g. microns to meters, quintal to pounds).

FAN-COOLED MOTORS — Re-rated, fan-cooled motors developed by Robbins & Meyers, Inc., have been illustrated and described in Bulletin 500-A. The motors are totally-enclosed models and rated from ½ to 40 hp in frames 182 through 405. Address: Motor Div., Springfield, Ohio.

CLAMPS, FITTINGS — The current Punch-Lok Co. catalog describes hose clamps, grooved hose fittings, special tools, and replacements parts. In addition it covers such subjects as the "Punch-Lok Method," uses and applications, and "How to Apply Punch-Lok Clamps." Address: 321 North Justine St., Chicago 7, Ill. (Catalog 300RG-56)

CRAWLER TRACTOR — International Harvester's largest crawler, the TD-24, is the subject of Folder CR-565-G, which is being distributed by the Construction Equipment Div., 180 No. Michigan Ave., Chicago 1, Ill. Named "Boss of the Big Jobs," the folder illustrates framework, a 200-hp engine, power steering and optional equipment.

CONSTRUCTION STUDIES—A brochure showing current information on drilling, blasting, and excavating methods is being published by the Explosives Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. Entitled "Construction Case Histories," the bulletin unfolds into a 3-p chart which details 48 construction case studies in condensed data form. Information is categorized under 26 headings of special interests. Data on geological formations, excavating practices, drilling equipment, bit performance, drill patterns, blasting data, and explosives ratios are given.

SAFETY SHOES — "The Margin of Safety," a 20-min motion picture produced by Hy-Test Safety Shoes, Div. of International Shoe Co., St. Louis 3, Mo., gets across the need for safety and safety shoes as part of the plan to avoid accidents. The film is directed to supervisory personnel and safety directors.

NON-SHRINKING MORTAR — The Master Builders Co., 7016 Euclid Av., Cleveland 3, Ohio, is distributing Folder E-38 to illustrate applications of the company's non-shrink mortar. Twelve construction operations are listed as projects in which non-shrink mortar is necessary. Master Builders sells non-shrink Embeco.

CABLE INSULATING — A 28-p booklet entitled "How To Insulate a Cable" explains the four most-used methods employed by manufacturers for applying insulation to electrical conductors. The publisher is Okonite Co., Passaic, N. J., which says users will find information helpful in choosing the right cable design for their needs.

CONCRETE MIXER—The Dandie Junior concrete mixer manufactured by the Kwik-Mix Co., Port Washington, Wis., is the subject of a 4-p catalog being distributed by the company. The mixer's capacity is 3½ cu ft of mixed material plus 10% overload.

WIRE ROPE—"Rope Dope," a publication of the Union Wire Rope Corp., presents in Vol. 5, issues 1 through 7, meth-

Continuous Loading with LONG Equipment at Elkhorn No. 3 Mine, Island Creek Coal Co.

Tons per man-shift increased 183% with LONG Piggyback Systems

At Island Creek Coal Company's Elkhorn No. 3 Mine, Evanston, Ky., extremely adverse mining conditions are encountered. The seam averages only 30 inches in height and roof conditions dictate the use of low-height equipment which permits extensive timbering and a rigid system of roof control.

During the first four years of the mine's operation, several methods of mechanized-loading mining were utilized, but with only limited success. In early 1954, when increases in productivity were imperative, a LONG Piggyback* bridge conveyor system was installed in one section. This first unit—consisting of a Pigloader* loading machine, Piggyback bridge conveyor, and LONG chain room conveyors—was so successful that seven additional systems were purchased and put into operation. The result—by late 1956, face productivity was increased by 183% (as reported in a recent issue of a leading trade journal).

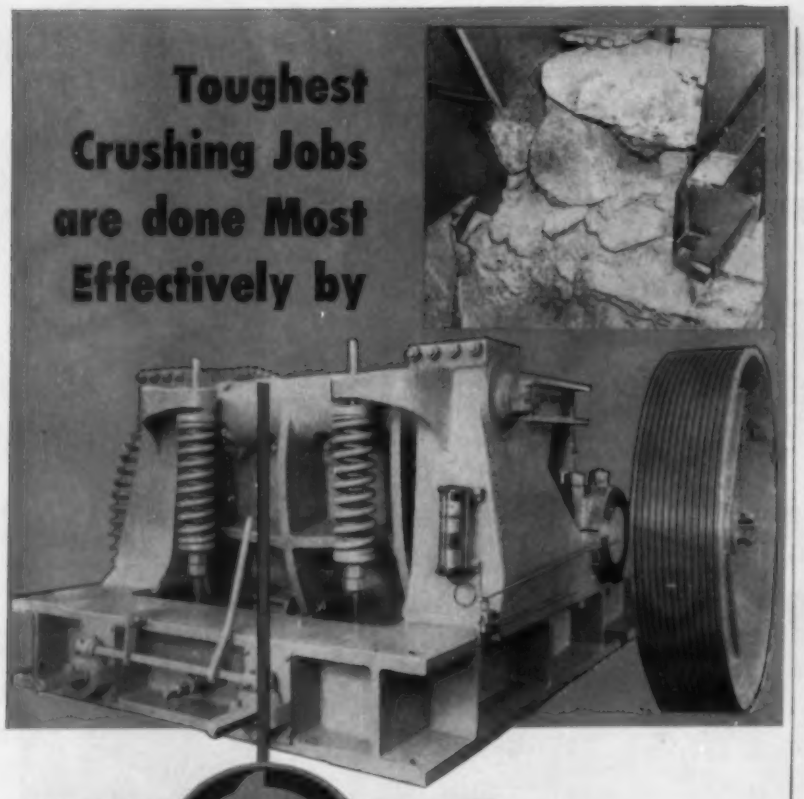
Whatever your *operation conditions—either thick or thin seams—the Piggyback System of conveyor mining will boost your production and lower your costs. We'll be glad to supply facts and figures—without obligation.*

**Trade Marks Reg. U. S. Pat. Office*

For complete details or a demonstration, write . . .

The **LONG** *Company*

OAK HILL W. VA.



McLANAHAN
SINCE 1835

ROCKMASTERS

- Steelstrut Toggle automatically protects against damage from uncrushable materials.
- Will handle wet, frozen, sticky, muddy materials.
- Continuous crushing—can be chokefed without primary grizzleys or screens ahead.

High-capacity Rockmasters are the means to best economy in crushing the hardest kind of rock, slate and all kinds and sizes of similar mine refuse. All ten of the first top-producing coal companies in the country now use McLanahan Rockmasters in severe crushing applications. Low headroom, automatic lubrication and roller bearings on countershaft.

Get All the Facts from this New Technical Data Bulletin No. RMTD-56

McLANAHAN & STONE
CORPORATION
PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835
250 Wall Street, Hollidaysburg, Pennsylvania

Equipment News (*Continued*)

ods of selecting and specifying the right rope for a job; care in handling and installation; and abuses a user should avoid. New information also has been included in the volume. In "Rope Dope" No. 1 of the new series a formula is given that enables wire rope users to predetermine the relative service life of different rope constructions.

CORE DRILLING—The second edition of a handbook on diamond core drilling has been announced by the Joy Mfg. Co. Entitled "Do's and Don'ts for Diamond Core Drilling," Bulletin D-38 contains 200 operating tips. Another section recommends types of diamond bits for use in various geological formations.

HOSE COUPLINGS—An 8-p bulletin describing Le-Hi heavy duty high pressure hose couplings is being offered by the Le-Hi Div., Hose Accessories Co., 2704 No. 17th St., Philadelphia 32, Pa. The bulletin, No. 115, covers applications of high pressure air, steam, gas, hydraulic, and liquid.

TAPE—The complete line of Bull Dog brand friction, rubber, and plastic tape is contained in a catalog being distributed by the Advertising Dept., Boston Woven Hose & Rubber Co., Boston 3, Mass.

INDUSTRIAL ENGINE—A specification sheet containing power curves, design details, engineering features and installation drawings for the high torque, heavy duty "Jeep" 6 is available from the Industrial Engine Dept., Willys Motors, Inc., Toledo, Ohio.

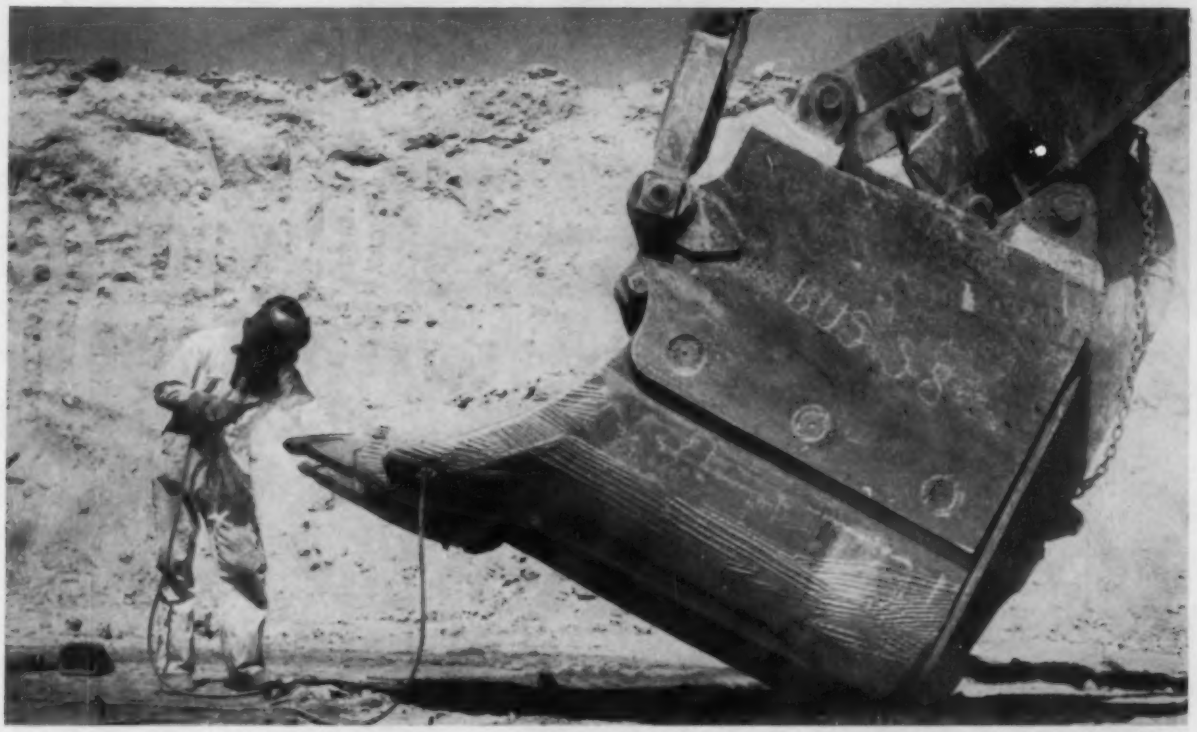
SCREW CONVEYOR BEARINGS — The ball-bearing equipment being added to Link-Belt's complete screw conveyor component line is described in Folder 2489 by the company. The units are designed to fit new or existing screw conveyors. Link-Belt Co., Dept PR, Prudential Plaza, Chicago 1, Ill.

FLOODLIGHTS—Stonco Electric Products Co., Kenilworth, N. J. condenses explanations of its entire line of cast aluminum floodlighting into Catalog 156. Lighting performance tables and prices are included.

METAL CUTTING AND SHAPING—Aircomatic cutting, a method for straight line and shape cutting of non-ferrous metals is described in a 24-p catalog (Form ADE 880) by Air Reduction Sales Co., 150 E 42nd St., New York 17, N. Y. The method uses standard Aircomatic[R] welding equipment.

INSULATING MATERIALS — Prices and types of insulating materials from adhesives to varnishes are contained in Catalog 571 prepared by the National Electric Coil Co., Columbus 16, Ohio. Mica products, tapes, varnished fabrics and other major materials are indexed for easy reference.

How STOODY HARD-FACING *keeps* STRIP MINING EQUIPMENT *on-the-GO!*



A few beads of Stoody Electric Tube Borium *keep the points of these shovel teeth out to size, while unprotected teeth lose a full inch of length in the same time.*

Heavy earth moving equipment used in open pit operations lasts far longer and requires fewer replacement parts when wearing surfaces are hard-faced with Stoody alloys. The illustrations show typical examples of both manual and semi-automatic applications. For top welding speed—2 to 4 times faster than manual welding—use Stoody semi-automatic tubular alloy wires... to speed maintenance during short down periods and between shifts, to save time and cut over-all costs.

Ask your Stoody dealer for a free copy of the Stoody Guidebook and the Semi-Automatic Wire folder; this literature covers hard-facing recommendations for all types of heavy equipment. Check the "Yellow Pages" of your phone book for local distributors—or write direct.

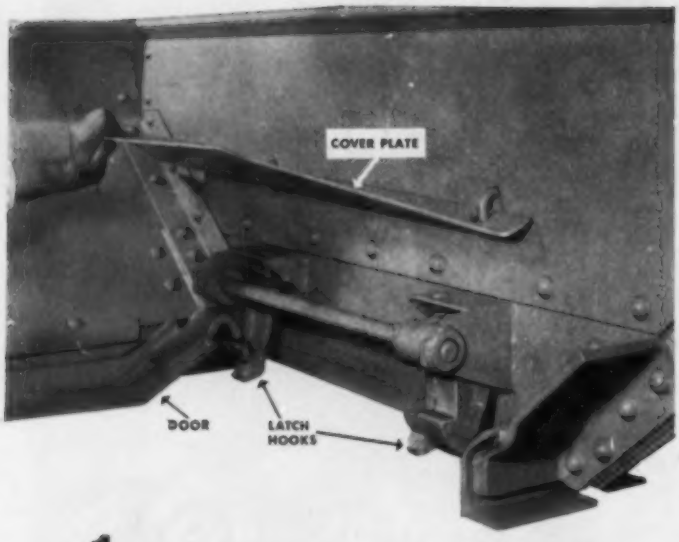
Parallel beads *of Stoody 100 are run along bed of dump trucks to reduce wear in these areas. Material packs between beads, further reducing wear.*

Shovel teeth *are first hard-faced as shown with Stoody 100 by the semi-automatic welder. Points are touched up manually during lunch time and at end of shift with 5/16" Stoody Coated Electric Tube Borium.*

Cutters and sides of scrapers *are subject to severe wear. Semi-automatic application of Stoody 100 provides protection.*

Ripper teeth *have wearing surfaces hard-faced semi-automatically with Stoody 100. 1 or 2 beads of Tube Borium hold points to size.*

STOODY COMPANY
11943 East Slauson Avenue
Whittier, California



Only S-D Automatics give you these advantages

1 TWO LATCHES FOR SAFE AND SURE LATCHING! They are tripped simultaneously underneath car for automatic dumping. With S-D "Twin Safety Latches" your bottom dumping car doors are actually padlocked twice. These latches (see photo above) are tripped independently by a pair of tripping devices mounted between the rails. (Note the tripping devices shown in bin photo on opposite page.) Both latches must be tripped simultaneously before the doors open. This eliminates doors opening accidentally anywhere along the haulage route.

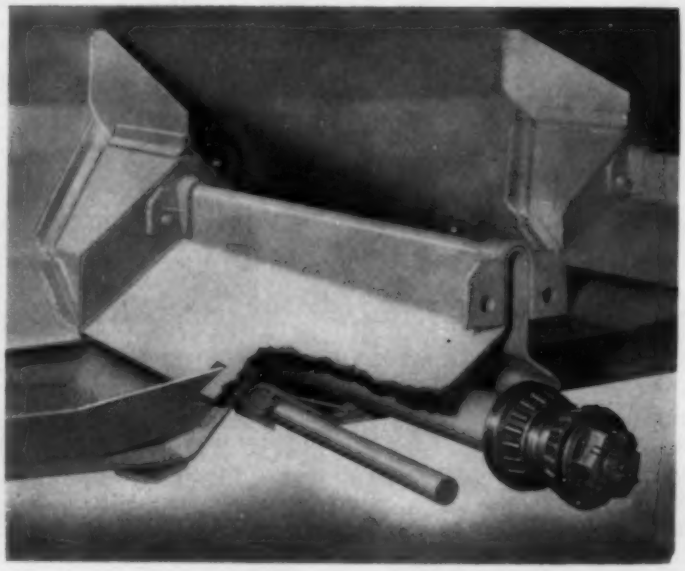
1 "Twin Safety Latches" for safe and sure latching

2 Safety Sealed against dust leakage

3 ¼ to ½ ton more capacity per car for the same overall dimensions

Visit us at the Cleveland COAL SHOW . . . Booth 1812!

2 SEALED AGAINST DUST LEAKAGE! Sanford-Day's exclusive bottom dumping car seal means two extra values: (1) Sealed S-D Automatics give you a new, safer in-the-mine operation by eliminating leakage of dust. (2) Sealed S-D Automatics enable you to make a tremendous reduction in track clean-up costs. Cross-sectional view at right points out how the flares extend over doors when closed, sealing material in car.



3 ONE-QUARTER TO ½ TON MORE CAPACITY PER CAR FOR THE SAME OVERALL DIMENSIONS is available only in S-D Automatics because of the construction features of Sanford-Day's exclusive bottom dumping car design. If you were buying, for example, 16 bottom dumping cars of any other make with a 4-ton level full capacity, you would need only 14 S-D Automatics of the same overall dimensions to haul the same tonnage. You would save two cars in every 16 . . . 12½ percent in original investment . . . 12½ percent in maintenance . . . 12½ percent less dead weight to haul. Any one of our sales engineers will demonstrate to your complete satisfaction just how we are able to give you this extra capacity.

THESE THREE fundamental and necessary advantages are offered only by S-D Automatics! They mean that only S-D Automatics can haul coal out of your mine at the lowest possible cost! Assure yourself of the maximum economies bottom dumping cars offer you by buying S-D Automatics! For complete information, write or call us today. Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tenn.

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PUMPS - OIL SPRAY SYSTEMS

NEWS ROUND-UP

Florida Utilities Seen As New Market For Coal

Southern coal operators, particularly Kentucky operators, began last month looking with renewed interest at a new southern market—Florida's utilities. The reason for looking was a good one. A wedge of higher oil prices had opened a competitive gap in the Florida fuels market where utility and industrial energy demands total 12 million tons of coal equivalent. Most of the demand currently is met by oil and gas.

Other reports also spurred the operators, who met early in the month in Washington with representatives from Florida utilities, southern railroads, and Appalachian Coals, Inc.

Energy demands in Florida, the conference group heard, had been doubling every 5 yr, a rate that would mean a need for 24 million tons of coal equivalent by 1962. More, the increasing demand was expected to continue advancing at the 5-yr doubling rate.

Only one major problem seemed to face operators, who were assured of favorable receptions by a number of Florida utilities. The problem was transportation, particularly rail transportation and its prohibitive rates. But, even this seemed vulnerable. The West Kentucky Coal Co. in Madisonville, Ky., had been delivering barge-freight coal to the Tampa Electric Co. via inland waterways and the Gulf of Mexico. And rails, themselves, at the Washington conference pledged cooperation to establish more favorable rates.

The Washington meeting was initiated after an exchange between Sen. Morton and McGregor Smith, chairman of the board, Florida Power & Light Co.

Florida Power & Light, said Mr. Smith, is interested in switching from oil to coal in three plants—Sanford, Palataka, and Fort Myers, Fla. He also called for propositions from Kentucky coal operators for coal delivered to 74 Florida plants. With this, Sen. Morton called in J. E. Tobey, president of Appalachian Coals, Inc., who responded with a tour among Florida utilities. The results indicated that further discussions aimed at cashing in on the new market held definite value. The Washington meeting followed.

If captured, the Florida market would not mean an overnight skirmish for coal operators. At best early development will require nearly 2 yr to convert boiler units for coal and to complete new plants that are now mere drawings. Meanwhile, coal will have to remain competitive with other fuels. But, prospects seem bright for many reasons.

1. Energy demand in Florida is doubling every 5 yr, a rate that is twice the national rate; oil prices are higher; coal carriers can use a possible return transportation haul of phosphates.

2. Total utility and industrial energy demand in Florida (mostly oil) now amounts to 12 million tons of coal equivalent. This is expected to reach 24 million tons by 1962, and to increase further at the same rate.

3. Florida phosphate production is at a record high—some 10,200,000 tons in 1956—and demand is increasing in domestic and foreign markets.

4. A number of transportation possibilities are available: all-rail; rail and ocean, via Hampton Roads; rail and barge, using New Orleans as a barging point; and river and barge, using inland waterways and the Gulf of Mexico.

The conferees included:

Mark Eastin, president, and **Robert Bowen,** vice-president of West Kentucky Coal, both of Madisonville; **Roy Carson,** Louisville, traffic manager of the Southern Appalachian (Harlan) and Hazard Coal operators Associations, and **Joseph E. Moody, W. W. McClanahan,** and **Sam Bledsoe,** all of Washington, of the Southern Coal Producers Association.

Robert H. Fite, president of Florida Power & Light; **M. R. McKinley,** vice-president of Tampa Electric; **Walter J. Tuohy,** Cleveland, president of Chesapeake & Ohio Railway Company; **R. J. Beatty, J. B. Young, Hewitt Bisett,** and **Porter Gray,** all of the C. & O.'s Richmond, Va., office.

W. Mason King, Washington, Southern Railway System; **Norman F. Cuthreill,** coal traffic manager for the Virginian Railroad Company, Roanoke, Va.; **J. H. Gooch,** Washington, general agent of the Louisville & Nashville Railroad; **F. L. Donaher,** coal traffic department, Norfolk & Western Railway, Roanoke.

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FLORIDA MARKET PLANNERS—Seated, MacGregor Smith, (left), Florida Power & Light Board chairman; Kentucky's Senator Thruston B. Morton; Robert H. Fite, president of Florida Power & Light; standing, Norman F. Cuthriell (left), Virginia RR; Joseph E. Moody, president, Southern Coal Producers Association; F. L. Donaher, manager, Coal Traffic Dept., N&W RR; Roy Carson, Traffic Manager, Louisville, Ky; Walter J. Tuohy, president, C&O RR; Julian E. Tobey, president, Appalachian Coals, Inc; M. R. McKinley, vice president, Tampa Electric Co.

Oregon Pushes Hydro-Steam Power Project

Core drilling crews have completed 18 holes and logged about 15,000 ft in the Eden Ridge coal field in Southwest-

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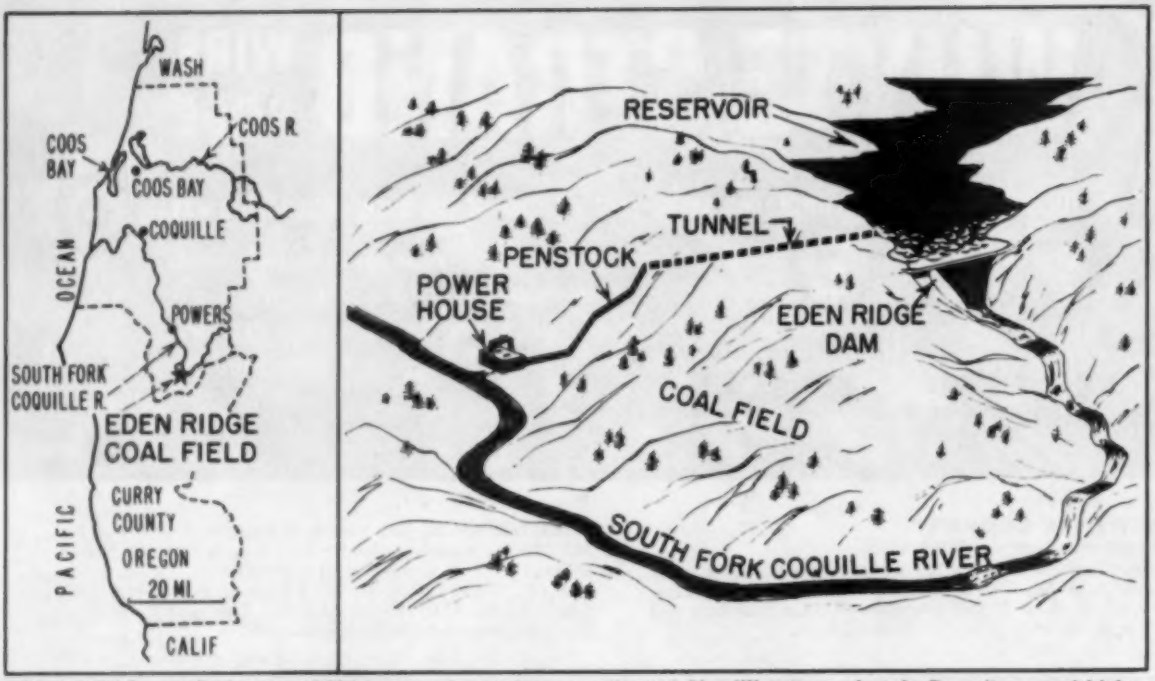

EDEN RIDGE coal field covers 5,000 acres and contains an estimated 50 million tons of coal. Deposits are of higher quality and offer better chance for low-cost recovery than those previously mined in Coos and Curry counties.

ern Oregon where the Pacific Power & Light Co. proposes a combined steam and hydro operation.

The proposed development would combine a 100,000-kw or larger steam-electric plant to be located near the mine mouth, and a hydro plant of at least 67,500-kw capacity. Site of the proposed dam is about 23 mi south of Powers in Coos County, Ore. The hydro-power plant would be located on the opposite side of Eden Ridge from the dam and would be fed by a tunnel through the mountain (See diagram).

D. O. Bergey, assistant general manager of PP&L's coast division, said the company has spent $300,000 on the coal phase of the proposed development since explorations were started. Total cost of the twin project could amount to between $30-$50 million, according to PP&L's president, Paul B. McKee.

Exploration work was reported by the company (Feb. 26, 1957) to be well enough advanced that some crews were being shifted to the hydroelectric project proposed for the nearby South Fork of the Coquille River.

E. A. Messer and Associates, Inc., Hillsboro, Ore., operated six rigs from September through January. Three have been in operation since and two of the diamond core-drilling rigs have been shifted off the mountain into the valley to start field work on the dam site.

A tunnel dug into the Carter coal seam for the removal of samples has been completed, according to the company, and the samples have been forwarded to laboratories for analysis.

The tunnel, driven 50 ft into the coal seam, was dug by a three-man team working principally with hand tools and a pneumatic power spade. The portal is 10 ft wide and 7 ft high. The coal has been hauled from the sloping mine by winch and two-wheeled cart and dumped at the mine head. In appearance, the mine is similar to slope-type tunnels common to the metals mining region farther south in Oregon's Siskiyou and Coast mountains.

By taking coal samples at the under ground end of the tunnel, the company has been able to obtain samples free of contamination by surface overburden or weather erosion, such as exists at the outcroppings along the ridge.

The latest tunnel is cut into the Carter seam at a point on the southwestern flank of Eden Ridge and is at a different location from a sample digging of last fall. At that time, a 60-ton carload taken was shipped to Alliance, Ohio, for fire tests by Babcock and Wilcox, boiler manufacturers.

George Beard, company power development engineer, said the company will undertake further core drilling and dig more tunnels on the north side of the ridge when weather conditions permit the crews to enter the area.

Studies of economic mining methods for the ridge have been assigned to J. W. Woomer & Associates, mining consultants, Pittsburgh, Pa.

Coal has been mined in Coos and Curry counties sporadically during the past century with the principal activity centered closer to tidewater. In contrast to the Eden Ridge deposits, which resemble vast saucer-like layers between other horizontal material, the beds worked in the early mines were tipped sharply on end. The seams were worked by vertical shafts, in many instances, and the seam would often vanish because of geological faulting.

The Oregon Dept. of Geology and Mineral Industries, noting the progress of initial explorations, reports the coal in Eden Ridge is of higher quality than coal mined in the eary days. The department has also reported the coal has physical and chemical characteristics of coal now being shipped overseas from the Rocky Mountain region.

When the Coos County project was

Bituminous Output

YEAR TO DATE	PRODUCTION
March 16, 1957	104,626,000
March 18, 1956	110,386,000

1957 output 5.2% behind 1956.

A month earlier output was 7.9% below 1956.

WEEK ENDING	PRODUCTION
March 16 1957	10,180,000
March 17, 1956	9,264,000

Anthracite Output

March 16, 1957	5,107,000
March 17, 1956	6,076,000

1957 output 15.9% behind 1956.

A month earlier 1957 output was 20.6% below 1956.

WEEK ENDING	PRODUCTION
March 16, 1957	445,000
March 17, 1956	430,000

first announced last summer, PP&L presi-

HD-21 crawler tractor, 204 net engine hp
315 scraper, 20 yd heaped, 15 struck

YOU CAN STRIP OVERBURDEN AND RECLAIM LAND PROFITABLY

with this crawler tractor-scraper team

There is a marked trend toward reclaiming worked-out pits—and a parallel trend toward the use of Allis-Chalmers crawler tractors and scrapers. Both are examples of wise management.

Land Reclamation—already a law in many states—eliminates to a large extent the scarred and worthless landscapes left by abandoned pits and piles of overburden. Properly reclaimed land usually returns far more than the cost of reclamation in higher resale value. Even where pits can be only partially filled, the land may be seeded profitably for pasture.

Allis-Chalmers HD-21 Crawler Tractor and 315 Scraper are ideal for this type of operation. This team is mobile and flexible enough to strip overburden and spread it immediately in a worked-out area of the pit. This eliminates the need of re-handling overburden and of calling in specialized equipment.

Curved and offset cutting edge on the scraper, plus torque converter drive on the tractor, are just two of many features that put this Allis-Chalmers team in a class by itself for this type of work. Let your Allis Chalmers construction machinery dealer give you the details. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS *Engineering in Action*

first announced last summer, PP&L president McKee pointed out that the combination of a possible hydroelectric site beside coal deposits is a rare one, especially in the fuel-short Pacific Northwest.

"If we are able to work out a feasible development of these two resources, it could mean both fuel and an industrial raw material as well as a new source of power for the region," Mr. McKee stated.

Simpson Coal & Chemical Buys Cambria-Clearfield

Less than two weeks after announcing plans to develop a 10,000-tpd mine in West Virginia's Mannington district, Simpson Coal & Chemical Corp. disclosed last month that it had acquired the Cambria-Clearfield Mining Co., the sixth acquisition by Simpson in the last 14 mos.

Simpson disclosed no purchase price, saying only that it had acquired all the outstanding stock of Cambria-Clearfield, which operates the Springfield No. 6 mine near Westover in Pennsylvania's Clearfield County.

With the acquisition Simpson owns and operates mines in Pennsylvania, West Virginia, and Ohio. Nearly all the mines were acquired during 1956 and 1957

On March 1, 1956 Simpson gained control of the Barnes-Dawson mine near Clarksburg, W. Va. Two weeks later, March 16, the company acquired the Wyatt Coal Co. mine in Charleston, W. Va., for an estimated $320,000. A little more than a month later, in April, Simpson bought the Seanor Mining Co., Saltsburg, Pa., for $1 million. In July, 1956, Simpson acquired the Misco mine near Zanesville, Ohio, then finished the year's shopping in December by acquiring the Wood Pocahontas Mining Co., Besoco, W. Va. The company's sixth purchase in 14 months came last month with the acquisition of Cambria-Clearfield.

Based on a 200-day working year, a production schedule set up by Simpson, if met, would result in total annual production of 4 million tons. Broken down, mine-by-mine, the individual properties would produce this way: Barnes-Dawson, 4,000 tpd, or 800,000 tons annually; Simpson Creek (Galloway), 500 tpd, or 100,000 tons annually; Misco, 3,000 tpd, or 600,000 tons annually; Seanor, 4,300 tpd, or 860,000 tons annually; Wyatt, 2,700 tpd (plus 1,000 tpd strip mining), or 740,000 tons annually; Wood-Pocahontas, 1,500 tpd, or 300,000 tons annually; and Cambria-Clearfield, 3,000 tpd, or 600,000 tons annually. Among all its mines Simpson is setting daily production at 20,000 tpd.

The 10,000-tpd mine Simpson plans to develop in West Virginia is scheduled to open in the spring of 1959, according to the company. It has already leased 11,500 acres of Pittsburgh seam coal in the Mannington district from the Baltimore & Ohio RR, the New York Central and the Pennsylvania RR.

COAL MEN ON THE JOB . . .

PEABODY COAL CO.—Nos. 31 and 32 mines, Kenvir, Ky., Foister Siler (left), mine manager, and W. C. Jarrell, chief electrician, No. 32 mine, duscuss problems at end of shift.

Preparation Facilities

Clinchfield Coal Corp., Moss No. 2 mine, Clinchfield, Va. — Contract closed with the Link-Belt Co. for a paddle mixer and elevator for thermal drying. Equipment is for ¼x100M and 100 Mx0. Capacity, 55 tph. Completion, April 1957.

Guyan Eagle Coal Co., Guyan No. 4 mine, Stowe, W. Va. — Contract closed with the Link-Belt Co. for a mine car trip feeder and car dumper to handle ROM at 500-tph capacity. Completion, July, 1957.

Clinchfield Coal Corp., Moss No. 3 mine, McClure, Va. — Contract closed with the Link-Belt Co. for a complete preparation plant, including heavy media, concentrating tables, thermal drying and crushing. Plant will handle ROM, 4x¼, 1¼x¼, ¼x0. Capacity, 1,500 tph. Completion, September, 1958.

Eastern Gas & Fuel Associates, Federal No. 1 mine, Grant Town, W. Va.—Contract closed with the Industrial Engineering & Construction Co., for a rotary car dumper, car stop, and feeder-retarder. Probable completion date, October, 1957.

Clyborne, Inc., Bluefield, W. Va.—Contract closed with the Jeffrey Mfg. Co. for a No. 100 unit washery.

The following contracts were closed during 1956, but were received too late for publication in the annual February **Coal Age** *listing of New Preparation Facilities in 1956.*

U. S. Pipe & Foundry Co., Bessie, Ala. — Contract closed with the Denver Equipment Co. for coal flotation equipment to handle 20 to 40 tph.

Alabama Power Co., Gorgas, Ala. — Contract closed with the Denver Equipment Co. for coal flotation equipment to handle 20 to 40 tph.

Anthracite Firm Buys Bituminous Business

The Lehigh Coal and Navigation Co. has entered into an agreement to buy the business of Boone County Coal Corp., producers of bituminous coal, it was announced jointly by C. M. Dodson, president, LCN, and William J. Clothier, president, Boone. The purchase price was not indicated.

Boone County Coal Corp. has soft coal mines at Sharples, in Boone and Logan Counties, W. Va., which last year produced about one million tons. Its coal is marketed under the trade name of "Boone-Chilton." Boone has offices at 1528 Walnut St., Philadelphia, and in Detroit.

Boone's properties are comprised of a single contiguous area of approximately 24,000 acres. Reserves are estimated to be more than 150 million tons of recoverable coal. Operations at present are largely in the extensive and highly regarded "Chilton seam." Its mines are

The single-motor design of the new National Mine TORKAR* A.C. or D.C. shuttle car is a major factor in reducing maintenance and operating costs

Electrical controls and wiring are greatly simplified because one, *single*, large capacity, non-reversing, A.C. or D.C. motor supplies all power for the new TorKar.

Driving through a torque converter, the motor operates at its most efficient speed, with less frequent starts and stops, and for much of the time under less than its full-load capacity. Ample opportunity is afforded for dissipation of heat. Power demand is less, and longer service life and lower maintenance cost are assured.

The torque converter absorbs and minimizes torsional shock of the drive line to the motor, and multiplies motor torque in varying amounts to meet demand. It also prevents the motor from being overloaded to the point where it might approach a stalled condition, thus inviting thermal damage.

Further reduction of load demand on the motor is accomplished by the constant-mesh, three-speed forward and reverse, patented transmission which makes it possible easily and quickly to select a gear ratio which will allow continuous movement of the car without jogging the motor or pulling its speed down to a point where it would operate inefficiently.

To learn in more detail how the TorKar can cut your maintenance and operating costs with these and other exclusive engineering and design features, write for literature or ask your National Mine representative to call.

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All-State Division, Logan, W. Va. — Anthracite Division, Forty Fort, Pa. — Ashland Division, Ashland, Ky. — Bemeco Division, Beckley, W. Va.

Kentucky-Virginia Division, Jenkins, Ky. — Western Kentucky Division, Madisonville, Ky. — Whiteman Division, Indiana, Pa. Morgantown, W. Va.

Here a mechanic uses a Heavy Duty Loxocket Wrench with ratchet adaptor to tighten down a bearing cap on a diesel engine. In this shop, all caps are first assembled without drive shaft and bearings so that bore alignment can be tested with a special cylindrical checking bar.

*Snap-on Tools

grip safe — grip sure

A man can lean into this Extra Heavy Duty Loxocket® Wrench — and do it with confidence. It has the strength and heft to handle the big, nut-turning jobs — quickly, surely, easily.

Sockets are hot-broached providing smooth walls and corners that are free from tears and cracks. They're heat-treated all the way through for toughness on the inside as well as the outside. These, and many other developments, give *Snap-on* tools that extra measure of strength, long life and smooth fit. They'll cut your tool costs — and your downtime.

If you have a problem involving special tool design or application or any other question on tools, talk it over with your *Snap-on* man. Write us or call your nearest *Snap-on* branch. Free catalog of mechanic's hand tools is yours for the asking.

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News Roundup *(Continued)*

located about 50 mi south of Charleston, W. Va., on the Chesapeake and Ohio RR. The properties include two mines, strippings, and a large, modern preparation plant.

No changes in personnel, operations or marketing policies are contemplated, Mr. Dodson said. The new ownership has in mind an expansion program which will increase production.

Acquisition of the bituminous property marks the Lehigh Coal and Navigation Co.'s second major expansion move this year. On Feb. 18, the Lehigh and New England RR Co., a wholly-owned subsidiary, announced its entry into the field of maritime shipping when six ocean vessels, including five liberty-type vessels and a T-2 tanker, were purchased from Pan-Oceanic Navigation Corp., New York, by Penn Navigation Co., a newly-formed Lehigh subsidiary. At the same time, it was announced that Penn Navigation had awarded a contract to Bethlehem Steel Corp.'s shipbuilding subsidiary for the construction of a 32,600-ton tanker.

Johnstown Coal & Coke Offers Scholarships

The Johnstown Coal & Coke Co. again this year offers two university scholarships in mining enginering of $2,000 each to employes or employe-sons of the Johnstown Coal & Coke Co. and the Williams River Coal Co. Object of the awards is to encourage younger employees and sons of employes to fit themselves for positions of a supervisory character. Since the inauguration of this program, scholarships have been awarded to five men.

Following previous practice, one scholarship will be offered to employees or their sons in Pennsylvania, and one in West Virginia. In West Virginia, the scholarship winner would attend West Virginia University. In Pennsylvania, the scholarship winner would attend Pennsylvania State University or the University of Pittsburgh.

There is no age limit on applicants. Candidates for a scholarship must be (1) a company employee or a son of an employe; (2) capable of passing college entrance examinations; and (3) interested in the future of the mining industry. Additional information, copies of the scholarship plan, and application blanks can be obtained from mine superintendents. Closing date for applications is April 12, 1957.

ACS Schedules 81 Ships For Service By Year's End

The labor log jam that has blocked efforts of American Coal Shipping, Inc., to get its coal hauling program underway has been broken with this result: the new shipping agency is now getting up a full head of steam which should see 81 of its vessels in service before the end of 1957.

The break came March 13 when the

Latest Stoper Drill Development Simplifies Roof Bolting in Low Coal

Le Roi-Cleveland S-20 Vac-Nu-Matic stoper, with new feed principle, is only practical machine in seams from 36" down to 26". Other sizes available for any seam height.

28-inch feed S-20 weighs only 65 pounds. It is the lightest dust-collecting type stoper available—operators say it's easier to use.

The revolutionary S-20 stoper is designed especially to provide a better way of producing roof-bolt holes.

Low coal or high coal makes no difference to this machine. It lets you put your roof-bolts wherever you need them — even in 26-inch coal. And high drilling speed along with light weight and a positive dust-collection system helps your miners get the work done faster.

New feed principle provides low overall height and longer travel. The S-20's feed consists of an air piston combined with a chain in such a way that the travel of the machine is double the travel of the feed piston. As a result, it drills a deeper hole with one steel change than a standard stoper does with two changes.

Because it does away with at least one steel change and in some cases two, this longer travel saves roof-bolting time.

The low overall height is obtained because the S-20 is the only stoper that starts its feed at the bottom of the machine. The starting height, regardless of feed length, is always 16½ inches.

Dust collection is instantaneous. There are no hoods or tubes to handle or adjust, when your miners use the S-20 Stoper. The cuttings and dust are pulled through the drill steel instantaneously and ejected through the side of the chuck housing into the dust box—no cuttings go through the machine itself.

There's complete absence of dust because the S-20 system pulls a high vacuum. It uses only 18 cu. ft. of air at 80 lbs. pressure to pull a static vacuum of 16½ inches of mercury or a fluid vacuum of 13 inches while the machine is running. Wet top presents no problem.

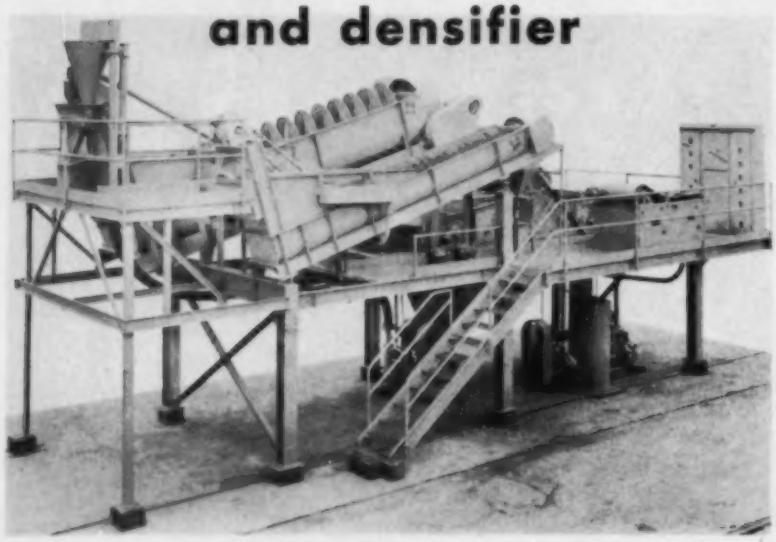
New design speeds roof-bolting operation. The S-20 has been in the field for more than a year, working in all types of coal mines. According to the evidence piled up during this period, S-20 users not only roof-bolt areas heretofore impossible to get at — they also do the work faster.

Features that contribute to this increase in efficiency are: Lighter weight. Low overall height. Longer feed. Positive dust-collection. Fast drilling speed.

Test the S-20 in your mine. See how it reduces roof-bolting costs. A demonstration can be arranged by contacting Schroeder Brothers, 3116 Penn Ave., Pittsburgh, Pa.; Acme Machinery Co., Williamson, West Virginia; Equipment Service Co., Inc., 617 North 9th St., Birmingham, Alabama. Or, you can contact us direct.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

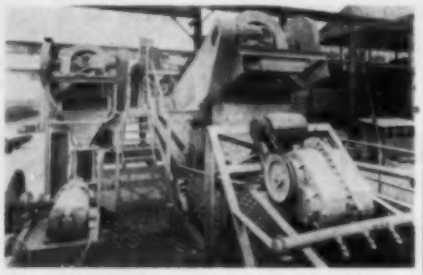
Prefabricated HMS plants with AKINS separator and densifier



Typical Akins 3-product HMS installation with Separator and Densifier. Note how Akins tank construction permits simple supporting structure. These Sweco-built plants are compact, simple in design, and convenient.

designed, manufactured, erected by Sweco

These prefabricated HMS plants are designed, manufactured and erected by the Southwestern Engineering Co., Los Angeles. Akins Separators were selected by Sweco because . . .



Media discharge end of Akins Densifier showing demagnetizing coil.

EXPERIENCE has proved these advantages of Akins

- Gradation of pool density from feed entry point to sink removal point provides natural cleaning of sink, and allows circulation of media at lower gravity and viscosity.
- Gradation of pool density also allows 3-product separation in one machine. Extraction of middlings requires only one media cleaning circuit.
- Start-up under full load, eliminates necessity of draining vessel after shutdowns.
- Variation in rate or grade of feed is not detrimental.
- Large pool area depth and volume minimize tramp refuse in the product and facilitate better recovery of values from fine sizes.

YOU can have all the advantages of Akins equipment AND the combination of mineral dressing and contracting experience offered by CIW and Sweco.

Write for Manual 56

COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

News Roundup *(Continued)*

Federal District Court in New York ordered ACS to (1) fire all men aboard its vessels who were obtained through National Maritime Union hiring halls, (2) do all further hiring off the docks, and (3) operate nonunion for an indefinite period. The National Labor Relations Board will make a formal ruling on hiring practices within the next 6 to 9 mo. But this ruling is not expected to have any adverse affect on vessel operations, an ACS spokesman said.

The new shipping agency's program to have 81 vessels in service before the end of 1957 breaks down as follows:

1. Four ships are now in active service —including the SS Coal Miner (owned outright by ACS) and three government-chartered Libertys, SS Casimir Pulaski, Cleveland Abbe and Walter Hines Page.

2. Three more Libertys are scheduled to complete reactivation by May 1. These are: SS Thomas Paine, Harry L. Glucksman, and Martha Berry.

3. Within 30 days after reactivation of these three vessels, ACS will ask the USMC to release 24 more Libertys. These should be ready for service by August 1.

4. As soon as all these vessels are in operation, ACS will make formal application for 50 additional Libertys which could be put into service in about 4 mo if there is no unusual congestion at reconditioning yards.

COAL MEN ON THE JOB . . .

K. P. FLOYD, preparation engineer, is responsible for daily analysis of coal at Peabody Coal Co. mines 31 and 32, Kenvir, Ky.

News Briefs

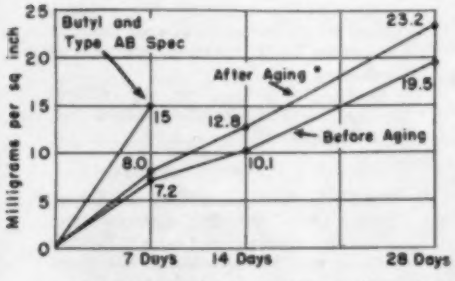
Osborne Mining Co., Inc., a Kentucky operator, and the Love & Amos Coal Co., Nashville, Tenn., are seeking a total of $12.3 million in a suit against the United Mine Workers and individual defendants.

In the suit, which was filed in Knoxville's Federal Court, the two companies are seeking $11 million as compensation for alleged losses under the Labor Management Relations Act of 1947, and $1.3 million punitive damages, which the two

ANACONDA TYPE SH-D Shovel Cable with neoprene jacket, Type AB butyl insulation—a good companion in wet locations.

New champ in the "old swimming hole"

—Anaconda Type AB butyl-insulated Shovel Cable



RESULTS OF mechanical moisture absorption test show Type AB absorbs less than *half* the moisture Industry Specifications allow.

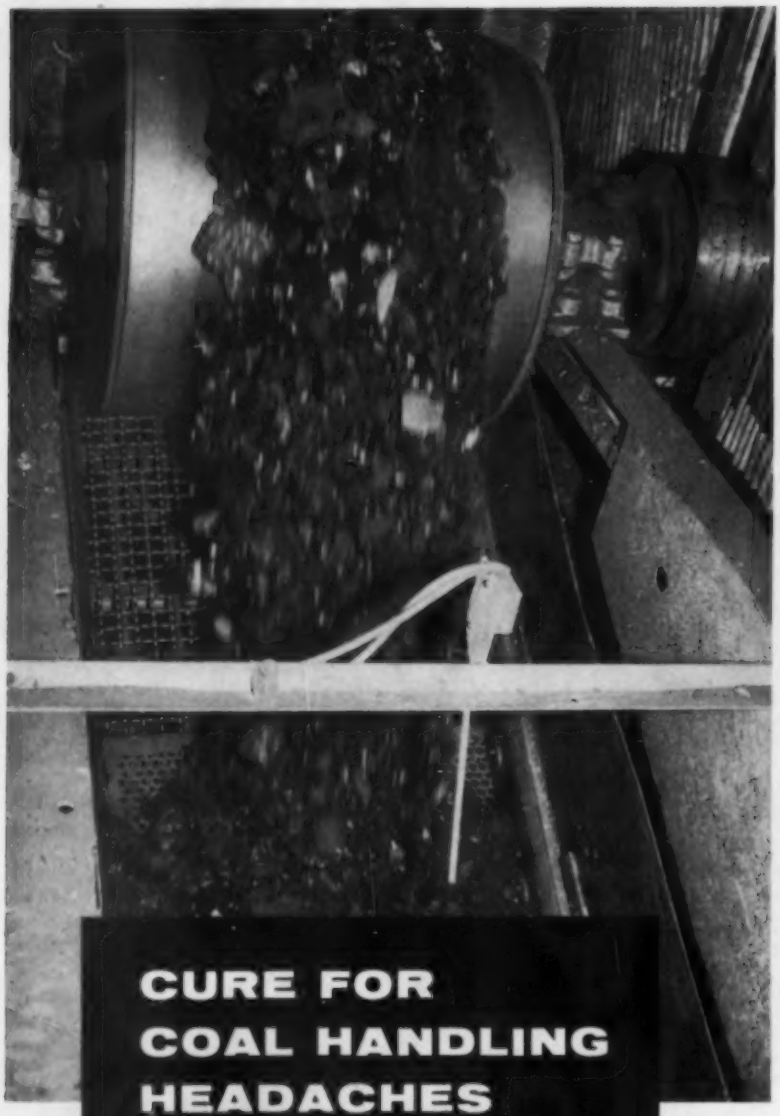
Where shovel cable is exposed to rain, snow or wet spots — moisture-resistant properties of the jacket *and insulation* are vitally important.

Latest test results show Anaconda Type AB butyl insulation (used in Anaconda Shovel Cable) *absorbs far less moisture* than the criterion set up by Industry Standards.

Result: longer cable life . . . greater freedom from failure . . . less down time for users of Anaconda Type AB-insulated Shovel Cable.

NEW ENGINEERING BULLETIN EB-27 has full details on performance of Anaconda butyl insulation in 15 Industry Specification tests. Ask the Man from Anaconda for your copy. And see your Anaconda distributor for your Shovel Cable. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 57319

SEE YOUR ANACONDA® DISTRIBUTOR FOR SHOVEL CABLE



CURE FOR COAL HANDLING HEADACHES

To get out more coal at less cost, Zeigler Coal & Coke Corporation's Bradbury Mine uses a Hewitt-Robins belt conveyor system. Coal, transferred from 5,000 ft. of panel belts to a 4,000 ft. mainline conveyor system, is discharged to a 42" wide, 950 ft., 16° slope conveyor traveling at 450 FPM. This conveyor delivers 450 TPH to an H-R Vibrex Screen which removes fines ahead of the breaker.

The underground haulage system, including conveyor belts, idlers, and machinery, was designed, engineered, and manufactured by Hewitt-Robins. To find out how H-R products and services can help you, consult your classified telephone directory for the nearest H-R representative, or contact Hewitt-Robins, Stamford, Conn.

HR HEWITT-ROBINS

CONVEYOR BELTING AND IDLERS...POWER TRANSMISSION DRIVES
INDUSTRIAL HOSE...VIBRATING CONVEYORS, SCREENS & SHAKEOUTS

News Roundup (*Continued*)

assert were "willful and wanton." The losses and damages occurred, the companies say, during strike violence in the Tennesse-Kentucky coal fields in 1955.

Glen Alden Corp., Wilkes-Barre, Pa., and Maremont Automotive Products, Inc., Chicago, Ill., by mutual agreement, squashed a move toward acquisition of Maremont by Glen Alden.

The agreement developed after a meeting of the Glen Alden board, during which all seven directors voted unanimously to ask Maremont for permission to terminate a contract under which Glen Alden would purchase the automotive products concern. The contract had called for acquisition of Maremont's major physical assets for about $3.4 million Glen Alden stock and assumption of Maremont liabilities. Chief objectors to the acquisition had been Francis O. Case, Glen Alden president; Gilbert S. McClintock, chairman; and Wentworth Johnson, a Philadelphia banker and director.

COAL MEN ON THE JOB . . .

J. S. DOUGLAS, resident engineer, Peabody Coal, Kenvir, Ky.

A new $8 million coal pier will be constructed at Hampton Roads by the Chesapeake and Ohio Railway.

The pier will be 1,254 ft long and will be known as Pier 12. Conveyor belts will be used to bring coal to a traveling tower to load tied-up ships, an arrangement similar to the Chesapeake & Ohio's Pier 14.

American Gas & Electric Co. is taking options on 15,000 acres of coal lands in Kentucky's Boyd, Greenup, and Carter Counties.

AG&E is picking up the options through the Franklin Real Estate Co., an AG&E subsidiary.

Freed Coal & Coke Co., an Emery County, Utah, operating company, was sold to the Huntington Corp., a Nevada company with headquarters in San Francisco.

Freed is one of the oldest coal companys in Utah. Its sale includes the

Built to last longer with corrosion-resisting Mayari R

Many thousands of mine cars, from little 4-wheelers to giant 17-ton double-truck jobs, have been built of Mayari R high-strength, low-alloy steel. Used wherever the lading comes into contact with the car, Mayari R provides extra corrosion-resistance, which in turn means longer service life.

Mayari R also resists abrasion and battering. In addition, it offers a yield point of 50,000 psi (in thicknesses up to and including ¾ in.) which permits the use of lighter sections and gages to reduce deadweight and increase payload.

Mayari R is readily weldable. Whether you use the electric-resistance, electric-arc, automatic submerged-arc, or gas-welding process, you can proceed with the same general methods you would use with ordinary carbon steel. Good welding speed can be maintained with Mayari R.

Today Mayari R is being widely used in such mine applications as ladders, chutes, buckets, conveyors, skips and cages, stairs, hoppers and gratings. Catalog 353 contains the essential technical data about Mayari R, along with illustrated examples of its use. You can obtain a copy promptly from the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

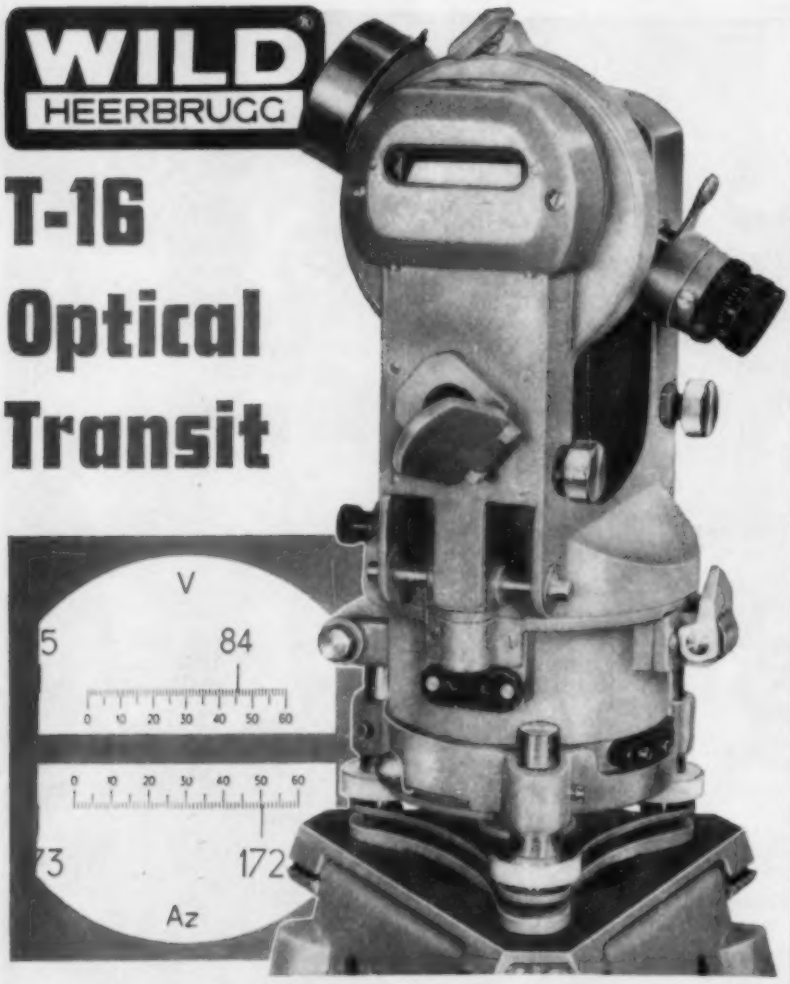
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Mayari R...High-Strength, Corrosion-Resisting Steel

WILD
HEERBRUGG

T-16 Optical Transit



A brand new **WILD** *instrument that's breaking records for speed, accuracy, easy set-up and operation!*

The T-16 embodies many brilliant new concepts. They add up to a degree of optical and mechanical precision, as well as versatility, that you'll find *impossible to duplicate with any other instrument at this price.*

NOTABLE FEATURES OF THE WILD T-16

- Direct scale reading to 1 minute; interpolation to 20 seconds.
- Azimuth and vertical scales seen simultaneously and read directly.
- Built-in repeating clamp for setting on zero. Eliminates lower plate motions.
- New optical plumb with upright image to speed setting up.
- Optional accessories include battery box providing illumination for scales, level vials and telescope reticle.
- Excellent for mining, highway and land surveying.

PRICE: $700 F.O.B. Port Washington, N. Y. Tripods extra. Write for Booklet T-16

WILD HEERBRUGG INSTRUMENTS, Inc.
Main at Covert Streets · Port Washington, N. Y.
POrt Washington 7-4843
SALES • FULL FACTORY SERVICES

News Roundup (*Continued*)

transfer of 4,000 acres and all the company's stock. The selling price was not disclosed.

The Hawley Fuel Corp., Bayside, N. Y., bought the Empire Pocahantas Coal Co., Welch, W. Va., for an undisclosed sum.

Pocahontas Empire Coal Corp., a Hawley subsidiary, will operate the Empire mine, which is situated at Keystone, McDowell County.

The Aluminum Co. of American bought the No. 2 mine of the Seneca Coal Co. near Sturgis, Ky., for an undisclosed price.

In addition Alcoa has taken options to purchase 10,000 acres of coal lands in the same area. The purchases were made to give Alcoa a large fuel supply source for the company's coal-fired steam generating plant and a new $80 million smelter in Warick County, Ind. Both facilities are about 45 mi from Sturgis. The purchase from Seneca includes a 10-mi railroad connecting No. 2 with a tipple on the Ohio river.

MEETINGS

Bituminous Coal Research, Inc., April 18, 19, Greenbrier Hotel, White Sulphur Springs, W. Va.

AIME, Pennsylvania Anthracite Section, spring meeting, April 26, Gonetti's Restaurant, Hazleton, Pa.

AMC, Coal Show, May 13-16, Public Auditorium, Cleveland, Ohio.

2nd Annual Appalachian Underground Corrosion Short Course, June 4-6, West Virginia University, Morgantown, W. Va.

National Coal Association, Annual Convention, June 4-6, Hotel Shoreham, Washington, D.C.

International Briquetting Association, Biennial Conference, Aug 19-21, Colorado Hotel, Glenwood Springs, Colo.

Peabody Coal Co. is closing it's No. 43 mine near Harrisburg, Pa., early this month.

Peabody opened the mine about 10 yr ago. George Wasley, assistant to the president, said No. 43 had been worked out. About 200 men will be affected by the shutdown.

The Interstate Commerce Commission combined the petition of Southeastern railroads for a general rate increase with similar petitions filed earlier by Eastern and Western carriers.

The latter railroads have petitioned for an overall increase of 22% including 5 to 7% increases recently authorized (*Coal Age*, p 134, Feb. 1956). Southeastern roads are seeking an overall increase of 15% including the 5% recently authorized.

HERE'S LOADER MOBILITY . . . EXCAVATING STRENGTH

LOADS 1½ CU YD AT A PASS . . . 2¼ yd with light materials bucket. Lifts up to 11,200 lb.

WORKS RIGHT UP ON A STOCKPILE where wheels dig in. Can build stockpiles higher, store many more yards of material in a given area.

TURNS IN ITS TRACKS . . . where many smaller loaders have to jockey.

DIGS INTO HARD-PACKED MATERIAL . . . exerts 20,000-lb break-out force, with 72 net engine hp and modern bucket design.

These are just four examples of how an Allis-Chalmers HD-6G tractor shovel offers a combination of strength, traction, flotation and mobility that enables it to replace a fleet of part-time specialized machines. You can count on it to boost production the year round. Ask your Allis-Chalmers dealer about the HD-6G . . . also the three larger tractor shovels with capacities up to 4 cu yd. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS *Engineering in Action*

with American

ROLLING RING COAL CRUSHER

In 18 months, this American Rolling Ring Crusher reduced 1,162,572 tons of 6″ x 1½″ bituminous coal to a minus 2″ product.

Total cost of replacement parts was less than 1/30th of a cent per ton of coal.

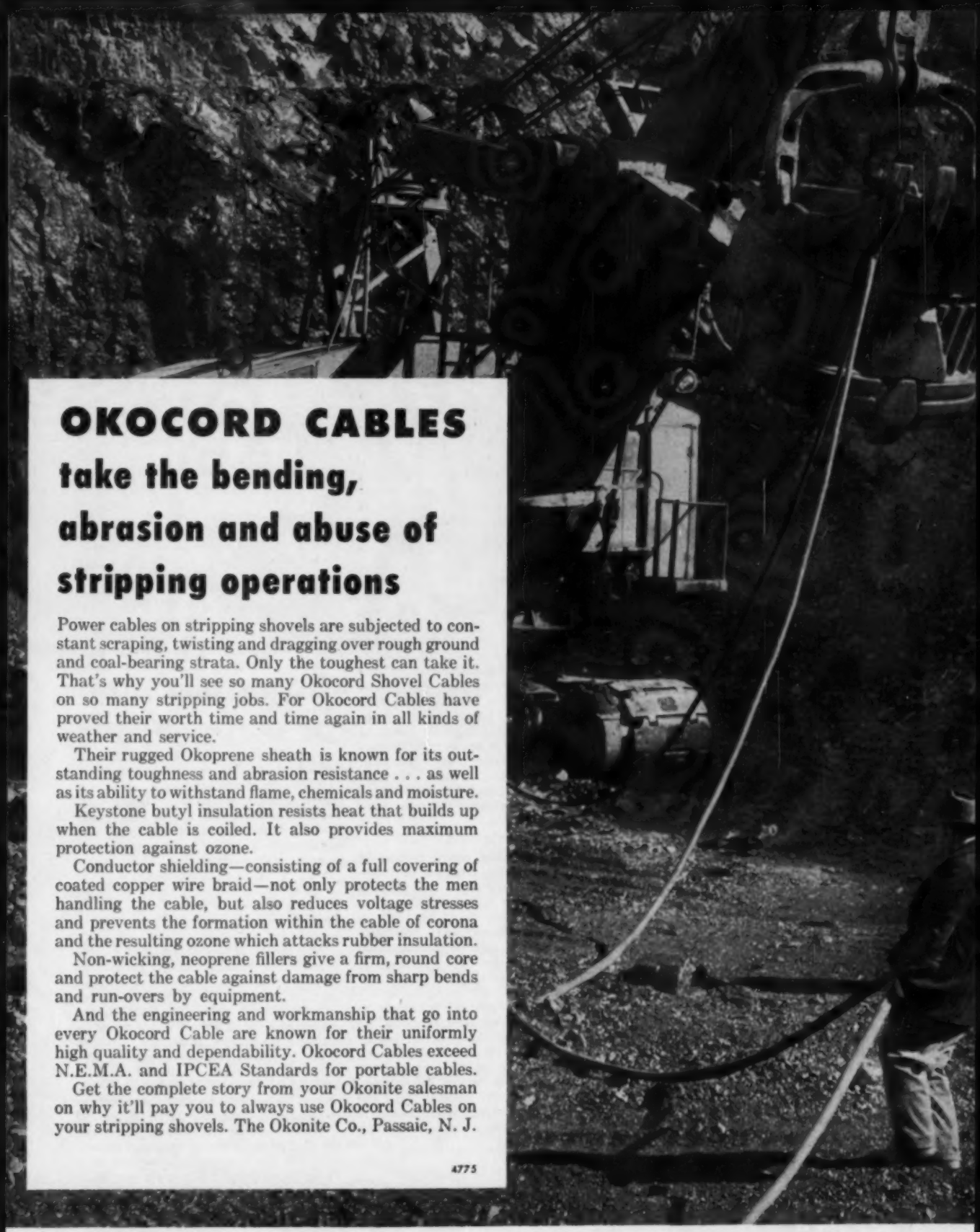
Write for descriptive bulletin on American AC Coal Crushers.

"When you figure Costs—
the best results come from American Rolling Ring Crushers."

American
PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave., St. Louis 10, Mo.



OKOCORD CABLES take the bending, abrasion and abuse of stripping operations

Power cables on stripping shovels are subjected to constant scraping, twisting and dragging over rough ground and coal-bearing strata. Only the toughest can take it. That's why you'll see so many Okocord Shovel Cables on so many stripping jobs. For Okocord Cables have proved their worth time and time again in all kinds of weather and service.

Their rugged Okoprene sheath is known for its outstanding toughness and abrasion resistance . . . as well as its ability to withstand flame, chemicals and moisture.

Keystone butyl insulation resists heat that builds up when the cable is coiled. It also provides maximum protection against ozone.

Conductor shielding—consisting of a full covering of coated copper wire braid—not only protects the men handling the cable, but also reduces voltage stresses and prevents the formation within the cable of corona and the resulting ozone which attacks rubber insulation.

Non-wicking, neoprene fillers give a firm, round core and protect the cable against damage from sharp bends and run-overs by equipment.

And the engineering and workmanship that go into every Okocord Cable are known for their uniformly high quality and dependability. Okocord Cables exceed N.E.M.A. and IPCEA Standards for portable cables.

Get the complete story from your Okonite salesman on why it'll pay you to always use Okocord Cables on your stripping shovels. The Okonite Co., Passaic, N. J.

4775

where there's electrical power . . . there's **OKONITE CABLE**

Use REMA to add years of life to your Belts

REMA is the New and Amazing Self-Vulcanizing Rubber Repair Material

REMA REQUIRES
- NO HEAT
- NO HEAVY EQUIPMENT
- NO CURING TIME DELAY

• REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage—*when repair work is completed belts may be returned to service immediately.*

• REMA seals out moisture, reduces mildew, rot and deterioration — the great enemies of conveyor belts. Your own maintenance man can quickly repair your belt — it doesn't take a skilled belt mechanic to use REMA.

• Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

Order from your Flexco-Alligator distributor

Write for Folder No. R4

FLEXIBLE STEEL LACING CO.

4638 Lexington St., Chicago 44, Ill.

REMA SELF-VULCANIZING RUBBER REPAIR MATERIALS

Foreign News

GREAT BRITAIN

In a giant effort to save coal and reduce dependence on oil imports Britain is embarking on a nuclear energy program for industry that will dot Great Britain with 20 nuclear power stations capable of producing between 5,000 and 6,000 mw each. The program will cost $2.73 billion, and is scheduled for completion by 1956. Lord Mills, Minister of Power, estimates that a full year's operation would save the British 18 million tons of coal. The added nuclear power, triple the amount produced today, would also help to counteract the economy's need for oil. Drastic reductions in oil imports since Egypt's blockade of the Suez Canal, in addition to Soviet infiltration into the Middle East, make the future availability of oil doubtful, according to the British cabinet.

According to provisional figures issued by the Ministry of Power, coal output in Britain in the first 8 wk of 1957 is running 1¼ million tons ahead of last year's rate. This is greater than the increase forecast over the whole year by the National Coal Board last Christmas. So far this year 36.77 million tons have been produced. The industry's labor force rose by a further 300 in the week ended Feb. 16, and faceworkers rose by 100. Owing to the very good attendance rate in the last few weeks, the percentage of voluntary absenteeism for the year so far is now below last year's rate. The involuntary absenteeism rate is substantially better. Inland coal consumption in the first 7 wk of the year, at 33.42 million tons, is nearly 600,000 tons less than in the same period last year. Exports and bunkers amount to 1.22 million tons, compared to 1.46 million tons, and imports to 391,000 tons, against 1.07 million.

The National Coal Board is looking for a site along the Durham (northern England) coast, where it can erect a steel boring tower to search for underseas coal. Chairman, N. C. B. Durham Div., E. H. D. Skinner, said: "We have to know where and how the coal seams go on under the sea and at what gradients. Boring through the sea bed is the way we are going to do it." The tower will be floated 6 mi out to sea on air cylinders, which will be filled with water at the position chosen. The whole construction will be allowed to settle on its foundations on the sea bed. It can later be moved by re-inflating the cylinders. No specific date has been fixed for the first bore, but it is estimated to take place somewhere about the end of 1958.

POLAND

The Soviet Union has informed Poland that it no longer has any need for Polish coal. All coal included in the Soviet-Polish trade agreement now under negotiation in Moscow is destined for shipment to East Germany which in effect means that Russia is subsidizing East German coal purchases from Poland. The quantity of coal to be included in the agreement is not yet known. Last year, out of a total export of 19 million tons, Russia's share was about 7 million. Planned exports for 1957 are about 13 million tons, but actual deliveries are expected to exceed this figure and the Russians are trying to get the Poles to agree to split the surplus. The Poles, however, would like to use all the surplus for hard currency.

Experts say the Poles are now getting the highest coal prices in Europe. They are selling to France at $25.50 per ton, to Finland for $28 per ton and apparently for about the same price to Sweden—against the average European price of $24.50 per ton. East German trade with Poland has dropped to a very low level because the East Germans have only manufactured goods to offer in return which the Poles say they can buy better and cheaper elsewhere. As a result the East Germans are getting some brown coal and only the merest trickle of hard coal from Poland. They are desperate for more hard coal. Presumably they will not get it as a result of Russian subsidy in trade with Poland.

The reasons given why Soviet Union no longer needs Polish coal are: (1) large development in Soviet coal production, particularly in the Low Basin which was former Polish territory; (2) important savings effected in coal consumption by electrification of railways, development of petroleum production and many conversions to oil as fuel instead of coal; (3) development of natural gas in the former Polish field at Daszawa in the Low Region. It is reported that gas pipelines are being built from this field to Kharkov to Leningrad. In other words the Soviet Union appears to have become self sufficient in coal despite its expanding fuel consumption.

USSR

The Soviet Union claims it has constructed the world's first gas turbine to operate from coal. The unit is said to have a capacity of 12,000 kw. Coal will be burned in sub-soil deposits, releasing gas measuring 650 deg to drive turbines. Engineers from the Turbine Works in Leningrad have finished design and construction work of the turbine (Type GT-12-3, according to Soviet sources) which will be used at the surface in Akulinino near the Schat River.

Earlier, smaller gas turbines had been installed in the shafts of small coal mines, receiving gas from coal excavations fired at the sub-soil level. But experience with sub-soil turbines proved them inefficient, and the new large surface unit was designed.

The Schat River power site sits directly over its coal supply. From the power site 4-in shafts have been drilled

Big Michigan Tractor Shovel loads out 4,400,000 lbs. of open hearth slag per day

Clearing ground for the Lake Calumet Harbor near Chicago, Contractor C. J. Wilson is removing 700,000 yds. of open hearth slag dumped by neighboring steel mills. This material weighs approximately 4000 lbs. per yd., is extremely abrasive and tough to dig. With one 2¼-yd. Michigan Tractor Shovel, Wilson is loading out 110 trucks per day—10 yd. six-wheelers. That's 4,400,000 lbs. of slag per day!

Does work of 1½-yd. shovel

Wilson says that he couldn't beat this production with a 1½-yd. shovel. Calculating the hourly cost (initial cost, depreciation, maintenance, etc.), of a dragline versus the Michigan, the Michigan does the job at least 40% cheaper. With the abrasive ground conditions which prevail on the job, Wilson is naturally enthusiastic about being able to do the job on rubber-tires.

"Can't beat the front-end"

Since the first Michigan Tractor Shovel was introduced early in 1954, more and more contractors have found that this machine will handle jobs which they'd never even attempted with rubber tired equipment. Veteran crawler-loader owners, like C. J. Wilson agree that you can't beat the front-end on this machine. It will out-dig any make or type of Tractor Shovel, bar none.

Balanced power and weight

The best way to understand the Michigan's operational advantages is to watch one *ease up to a pile of tough material and come out with a heaping bucket load.* You don't have to ram the pile to get penetration. The Michigan's combination of bucket action, weight and power enables the machine to *dig its way* into the pile. 133 diesel horsepower flows smoothly through the 3-to-1 torque converter, 4-speed power-shift transmission and heavy duty drive axles right out to four big tires. Planetary gears in the wheel hub eliminate axle breakage . . . they take 70% of the torque load off the shafts.

Standard on all models

Clark torque converter, power-shift transmission and planetary wheel drive axles are standard equipment on every model in the Michigan Tractor Shovel line—1-yd., 1⅜-yd. and 2¼-yd. capacity. In each capacity, a Michigan Tractor Shovel will give you more useable digging power and traction than you've ever seen on this type of machine—faster production, lower cost per yard. For proof, ask your Michigan distributor to demonstrate—*you name the job.*

Clean design of the Michigan bucket mechanism provides good dumping clearance. Note the heaping bucket load: 40-degree low-level tip-back guarantees heaping loads of any material which can be heaped.

Michigan is a registered trade mark of

CLARK® EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2473 Pipestone Road
Benton Harbor 14, Michigan

"Continental Conveyors
have improved our coke quality"

"Our Continental coke loading boom installation at our plant at Holt, Ala. has played a big part in improving the quality of our coke," says Newton DeBardeleben, president of the "Southwide and Diversified" DeBardeleben Coal Corporation, headquarters, Birmingham, Ala. "It has materially decreased degradation and segregation of sizes in moving coke from our screening plant to railroad cars. It has been in service since 1951 without a shutdown."

In many installations in the coal field, where uninterrupted trouble-free operation is so vitally important, Continental conveyors have scored outstanding records because of their:

RUGGED RELIABILITY BALANCED DESIGN
LONG LIFE MINIMUM UPKEEP
SMOOTH PERFORMANCE
ECONOMY OF OPERATION

Continental's wide product range and engineering know-how can provide a conveying system tailored to your specialized needs. Phone or write any of our offices for complete information.

CG-5716

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA
CGC ATLANTA CLEVELAND DALLAS KNOXVILLE
MEMPHIS MOBILE NEW YORK 17

Foreign News *(Continued)*

to the coal deposits—about 164 ft below the surface. Half the shafts are connected to oxygen pumps, the other half to the gas turbines. The shafts are also equipped with ignition mechanisms, which set fire to the coal. At the same time pressure-injected oxygen is fed to the flames to increase the gas yield.

The Schat River plant is undergoing test runs at this time, according to Isvestija, the Moscow daily paper. During the tests technicians take gas samples every hour to study chemical composition, to measure temperature, to test smell, caloric value, and the humidity of the gas. Also, the volume of the gas collected every hour is measured, as is the consumption of oxygen.

Temperature rises over the 650 deg mark are counteracted by injecting water into the oxygen shafts. There are 50 injection shafts and 50 gas shafts with a total footage of 20,000 meters (65,616 ft) necessary for the turbine. The shafts follow the burnt-out deposits for continuous operation of the turbine.

The chief engineer, S. A. Likewitsch, declares that the plant is a "combined hard coal mine, a gas plant, and an electric power station in one unit. Electric power produced by this unit is lower in cost than steam turbine-derived electricity, and only 35% of the labor staff of a steam turbine plant of comparable size is needed in the coal-gas turbine unit."

The USSR expects to deliver power from the "Schat" coal-gas plant soon. At that time, the unit will be incorporated into the "Mos-Energo" system.

AUSTRIA

Austrian purchases of coal from the United States are believed to exceed 500,000 metric tons for the first quarter of 1957. During the same period, deliveries from West Germany were expected to total 450,000 metric tons of hard coal (280,000 coking coal; 87,000 steam coal; 70,000 gas coal; and 13,000 anthracite.) France shipped an estimated 37,000 metric tons of Saar coal (as against 62,000 metric tons actually delivered during the first quarter of 1956). Poland promised to ship 330,000 metric tons of hard coal to Austria during the first quarter of 1957, out of a requested total of 370,000 metric tons. Arrears in Polish coal deliveries date back to the last quarter of 1956. The USSR shipped an estimated 20,000 metric tons of hard coal and 5,000 metric tons of anthracite coal during the first 3 mo of 1957. Czech deliveries were expected to total 45,000 metric tons, but contained in this volume are arrears from the 1956 goods exchange agreement. Yugoslavia might deliver 3,000 metric tons.

During 1956 Austria increased coal imports 7% over 1955. Of total of 4,400,000 metric tons of hard coal and hard coal briquettes imported during 1956, Austria purchased slightly more than 2,000,000 metric tons from the United States. Austria's production in 1956 amounted to 160,000 metric tons

which can be heaped.

2473 Pipestone Road
Benton Harbor 14, Michigan

Bethlehem Roof Bolts, used with square plates and wire mesh, in metal mine.

You get increased safety with Roof Bolting

Mines become safer, with the danger of severe roof falls unlikely, when you install Bethlehem headed roof bolts. This is because the bolts anchor overlying strata into a thick, secure beam.

Bethlehem roof bolts have other advantages, too. Their use makes possible wider openings and clearances . . . full use of mechanized equipment at the face . . . good ventilation, due to the absence of bulky supports . . . and no fire hazard.

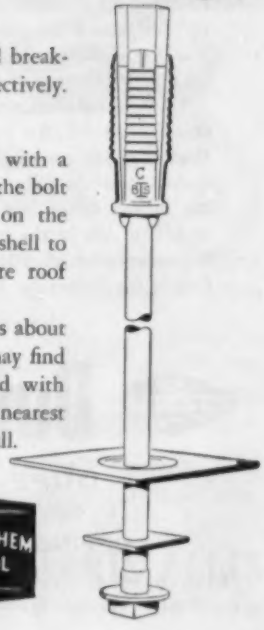
Four Types of Headed Bolt

The Bethlehem square-head roof bolt is manufactured in four types: a ¾-in. carbon-steel bolt and a ⅞-in. high-strength bolt, each of which has a typical breaking load of 24,000 lb; a ¾-in. and a ⅞-in. high-strength bolt, having typical breaking loads of 34,000 lb and 45,000 lb, respectively.

How Bolt Is Used

The Bethlehem headed roof bolt is used with a malleable-iron shell and steel plug. When the bolt is tightened, the plug is drawn down on the threads, expanding the four leaves of the shell to provide positive locking action. A square roof plate provides additional support.

We'll be glad to answer your questions about using the square-head roof bolt. Or you may find our 1-in. slotted roof bolt, which is used with a steel wedge, more to your liking. The nearest Bethlehem sales office is awaiting your call.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

The strongest rack bar makes the strongest jack

The 516 MT has long been a favorite with coal miners. It can raise 5½ tons as much as 9½ inches, is only 16 inches high when closed and has the famous oblong rack bar for greater strength and dependability.

A ratchet jack such as the Duff-Norton all-purpose 516 MT is no stronger than its rack bar—the notched steel bar which moves up and down supporting the load. The forged-steel rack bar on this five-ton capacity mining jack is stronger than the rack bar on any other make. *It's stronger because it's larger.*

Even a brief examination of the jack will confirm the truth of this statement, for the bar on Duff-Norton jacks is oblong, while that of other makes is square.

Ask your distributor for information on Duff-Norton coal mining jacks—there is a Duff-Norton jack for every pulling, pushing or lifting job in the mines. Or, write the world's oldest and largest manufacturer of lifting jacks for a copy of AD-10-J, "A Handy Guide for Selecting Duff-Norton Mine Jacks."

DUFF-NORTON **Duff-Norton Jacks**

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION: Danville, Illinois

Rachet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Rachet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

Foreign News *(Continued)*

of hard coal. This output—about the same as in 1955—is expected to continue for the next 2 or 3 yr. The leveling-off in production is attributed to the inadequate exploration and expansion of the past years when the price of domestic coal remained stable despite drastic increases in production cost (labor, power and machinery cost).

CZECHOSLOVAKIA

Professor Dr. Josef Cermak, Prague Polytechnicum, has devised a system for using coal dust and inferior-grade coal particles up to 0.197 in Czech steam locomotives. The system requires a carriage between the steam locomotive and the coal tender. The new carriage contains a pneumatic fuel (coal dust) transporter line with two ventilators, and two small steam engines which power these ventilators. The coal, after passing through a measuring funnel, is burned at high speed in a cylindrical container and is then injected into the locomotive's normal firing pit. There, the heated coal particles heat up the water pipes for steam production. By speeding up the coal burning, the new system attempts to make better use of the caloric value of coal dust and fine-grain coal, even of inferior quality. The raised temperature makes the ash melt into slag. The formation of slag decreases the creation of dust and dirt and also solves the disposal problem since up to 90% of the slag is collected in semi-liquid form in the ash pans. This new system for using inferior coals has been tried out recently in Czech steam locomotive "464.0" types.

CANADA

As a member of the Alberta legislature representing the Drumheller mining area, Provincial Highways Minister Gordon E. Taylor has called on Canadians to fight imports of United States coal. His aim is to protect markets for Canadian coal. He charges the Canadian government with encouraging "an industry outside Canada at the expense of an industry in Canada." While Canada imports coal from the United States, Mr. Taylor says, her own mines are closing for lack of markets. The federal government, Mr. Taylor declared, "has no policy at all on coal, unless it is a subtle policy aimed at bringing in American coal." Canada, he reported, bought 17 million tons of United States coal in 1955 while miners in Nova Scotia, Saskatchewan, Alberta and British Columbia "sat around waiting for the whistle to blow and the lights to go on in the tipple." He added that some of the imported tonnage reached Manitoba, Saskatchewan and Alberta. During remarks made before the Alberta legislature last month Mr. Taylor said that at only one time in history has the Canadian coal industry been fully appreciated. That time, he said, was during World War II when the United States cut off shipments of coal to the Canadians.

Here no motor can be too safe . . .

so Louis Allis Bureau of Mines permissible motors are used for lasting dependability

Nothing has been spared to give this Louis Allis Mine Type electric motor the utmost margin of safety. Special cartridge bearing construction assures long bearing life. And then there's the new research development of Louis Allis: special varnishes that afford maximum protective insulation against moisture.

They're built tough to take the physical punishment of coal mine service. Ample use of lock washers and wired bolting keeps all parts tight and in place — end bells are doubly secured by extra bolt fasteners. Every construction and design detail is engineered to match prevailing coal mine conditions.

For conveyors, cutters, pumps, fans — whatever your modernization program includes — consider this motor by Louis Allis—originator of the explosion-proof motor.

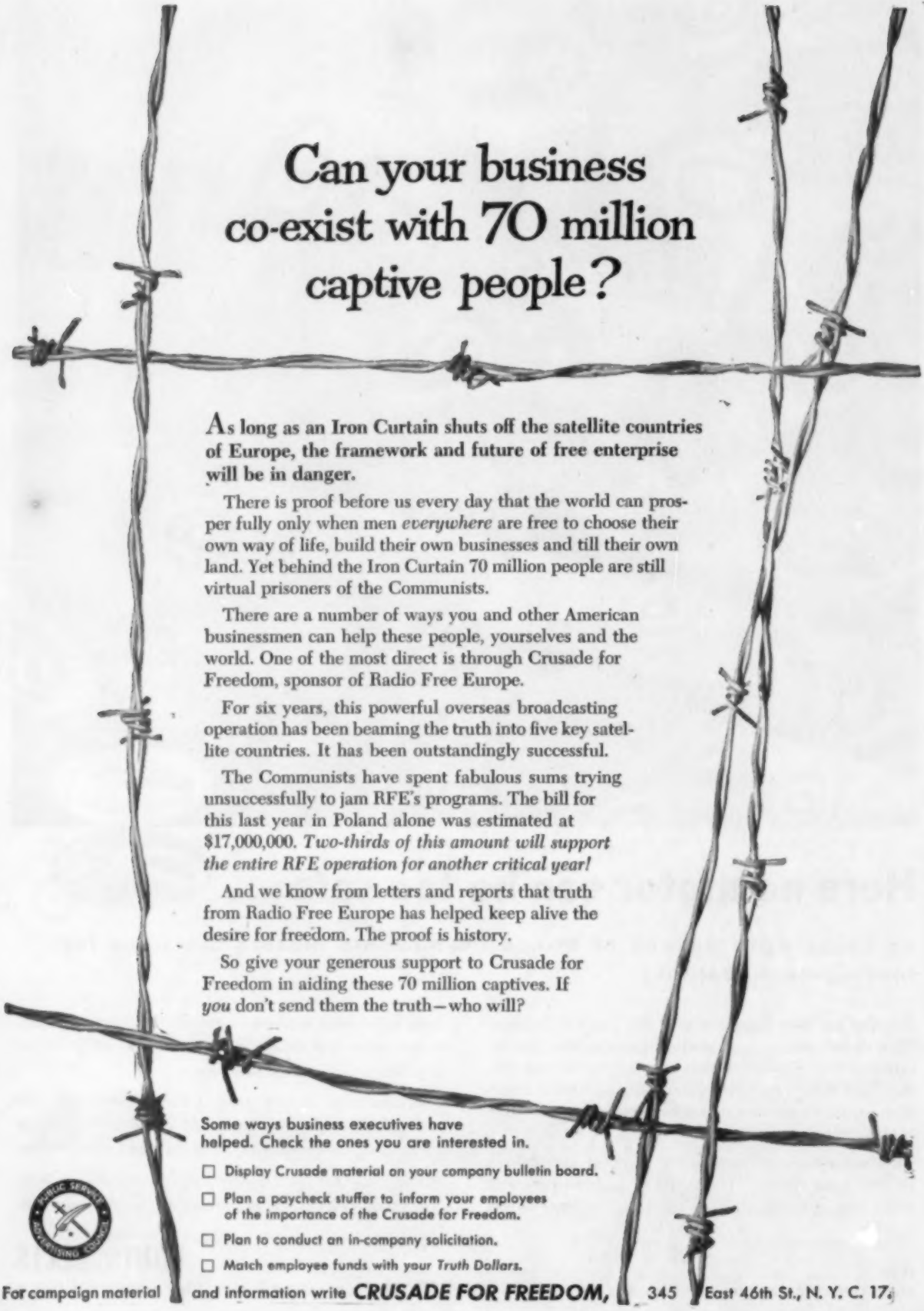
Write today for our file-sized DC Motor bulletin 1450. The Louis Allis Co., 441 E. Stewart St., Milwaukee 1, Wis.

LOUIS ALLIS

EP-103

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Can your business co-exist with 70 million captive people?



As long as an Iron Curtain shuts off the satellite countries of Europe, the framework and future of free enterprise will be in danger.

There is proof before us every day that the world can prosper fully only when men *everywhere* are free to choose their own way of life, build their own businesses and till their own land. Yet behind the Iron Curtain 70 million people are still virtual prisoners of the Communists.

There are a number of ways you and other American businessmen can help these people, yourselves and the world. One of the most direct is through Crusade for Freedom, sponsor of Radio Free Europe.

For six years, this powerful overseas broadcasting operation has been beaming the truth into five key satellite countries. It has been outstandingly successful.

The Communists have spent fabulous sums trying unsuccessfully to jam RFE's programs. The bill for this last year in Poland alone was estimated at $17,000,000. *Two-thirds of this amount will support the entire RFE operation for another critical year!*

And we know from letters and reports that truth from Radio Free Europe has helped keep alive the desire for freedom. The proof is history.

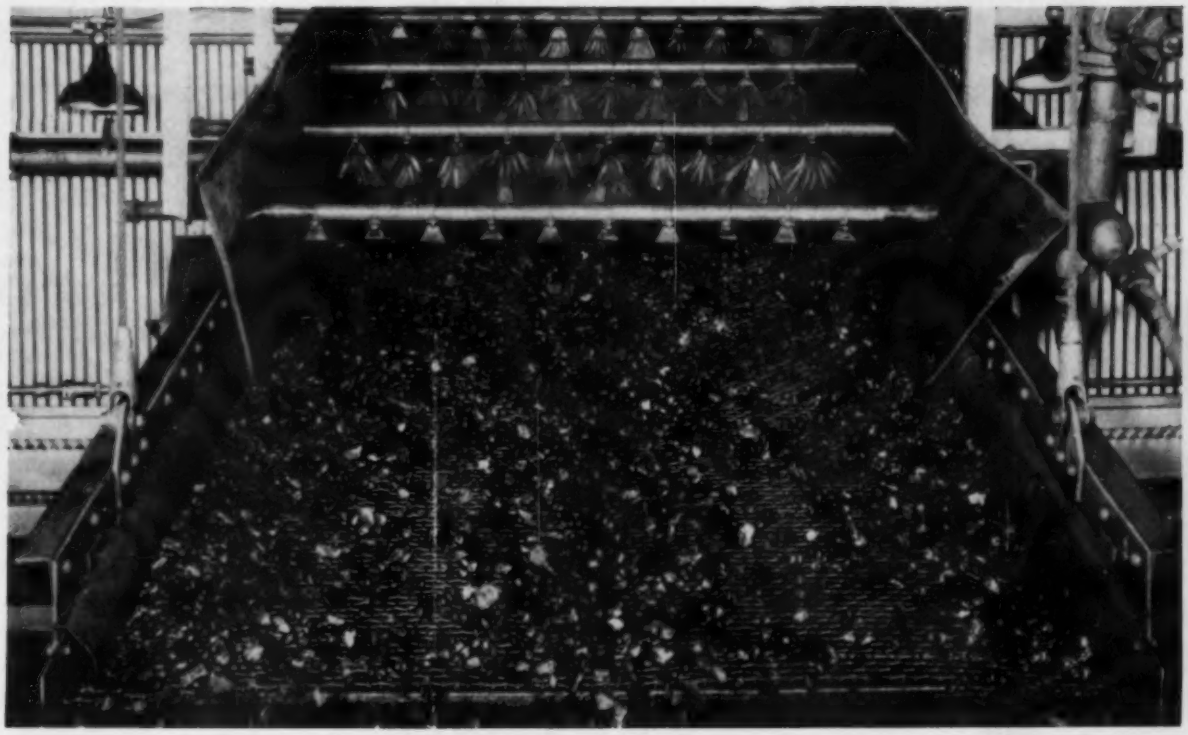
So give your generous support to Crusade for Freedom in aiding these 70 million captives. If *you* don't send them the truth—who will?

Some ways business executives have helped. Check the ones you are interested in.

- ☐ Display Crusade material on your company bulletin board.
- ☐ Plan a paycheck stuffer to inform your employees of the importance of the Crusade for Freedom.
- ☐ Plan to conduct an in-company solicitation.
- ☐ Match employee funds with your *Truth Dollars.*

PUBLIC SERVICE ADVERTISING COUNCIL

For campaign material and information write CRUSADE FOR FREEDOM, 345 East 46th St., N. Y. C. 17



At coal processing plants throughout the nation, Wissco-Loy Screens are the choice for sizing operations. ***It's because...***

...WISSCO-LOY® SPACE SCREENS

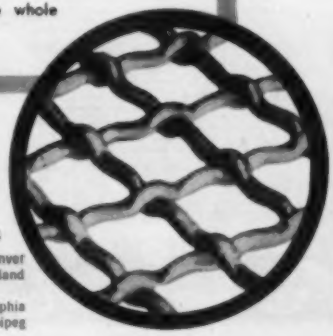
are economical, yet tailor-made for the job!

There's an easy way to help reduce your cost per ton of material screened—just switch to economical Wissco-Loy Space Screens.

Although they are economical in initial cost, Wissco-Loy Screens offer maximum accuracy because *they are tailor-made to your specific need.* Long-lived? You bet! Wissco-Loy Screens are made from a tough special wire, and every knuckle is carefully crimped to prevent "hidden wear" at the wire intersections.

What's more, Wickwire engineers are always available to help you solve your screening problems and then to recommend the right screen for your job. Get the whole story right now without obligation. Just contact your nearby CF&I representative or write direct to the nearest sales office listed below.

Need stainless steel space cloth or extra-rugged screens? Your CF&I representative is the man to see for these, too. He can supply a complete line of stainless steel, as well as extra-tough, oil-tempered Super-Tempered Precision Space Screens. Get the whole story from him today!



CF&I SPACE SCREENS
THE COLORADO FUEL AND IRON CORPORATION

4233

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver
El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland
Pueblo • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Wichita
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Toronto • Montreal • CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

Here's How...
to make a
PROFIT
from COAL FINES

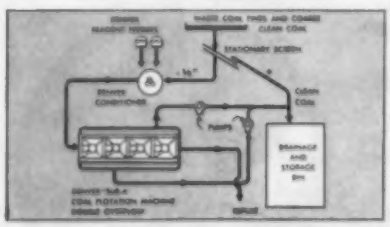
with
DENVER "Sub-A"
COAL FLOTATION

Simple...Low Cost!

You can handle coarse coal (—⅛"x0") at the head of your circuit in DENVER "Sub-A" Flotation Machine. You save coarse as well as fines in a coal product which is easily dewatered! You have simple, low-cost system.

Over 90% of all coal flotation plants in U. S. are Denver "Sub-A", an outstanding testimonial to DECO's experience, engineering "know-how" and equipment.

DECO can provide complete testing, engineering service, flow-sheet design and all equipment for your coal flotation plant. One source of supply, one responsibility. Write today!



DENVER EQUIPMENT COMPANY

Personal Notes

S. M. Cassidy, vice president, Pittsburgh Consolidation Coal Co., has been elected president and director of the Harmar Coal Co., a Pitt-Consol affiliate. He succeeds **G. A. Shoemaker**, who continues to serve as a Harmar director. Mr. Cassidy's personal rise in the coal industry began in the mid-thirties, when he was superintendent of the Saxton Coal Co., Indiana. In November, 1936, he joined the Weirton Coal Co. as superintendent of mines near Uniontown, Pa. By 1944 he had acquired the rank of vice president. Two years later, in February, 1946, he resigned from Weirton to join the Consolidation Coal Co. as vice president in charge of Kentucky operations. In June of that same year, with the formation of the Consolidation Coal Co. (Ky.) Div., he was named president. In December, 1953, he was named a vice president of Pittsburgh Consolidation Coal Co. Less than a year later, in April, 1954, Mr. Cassidy was elected president of the Renton Coal Co., an operating company jointly owned by the Great Lakes Steel Corp. and Pitt Consol.

Lyman Fearn of Rock Springs has been reappointed by Gov. Milward L. Simpson to a 2-yr term as Wyoming state coal mine inspector. Mr. Fearn has been state coal mine inspector the past 10 yr. The Wyoming senate also confirmed the governor's appointments of **Stanley Laya**, Dayton; **Robert Yourston**, Stansbury, and **Edwin Swanson**, Superior, to two-year terms on the state board of examiners for coal mine inspectors.

E. Minor Pace has been appointed general superintendent in charge of all coal mining operations of the Inland Steel Co. Mr. Pace, before the promotion, was superintendent of the company's mines at Wheelwright and Price, Ky. He was employed by Inland in 1946, and was put in charge of the company's central coal preparation plant in 1950 as superintendent. In 1951, he was promoted to mining engineer in charge of mine research and special assignments. He has served as superintendent of both Wheelwright and Price mines since 1953.

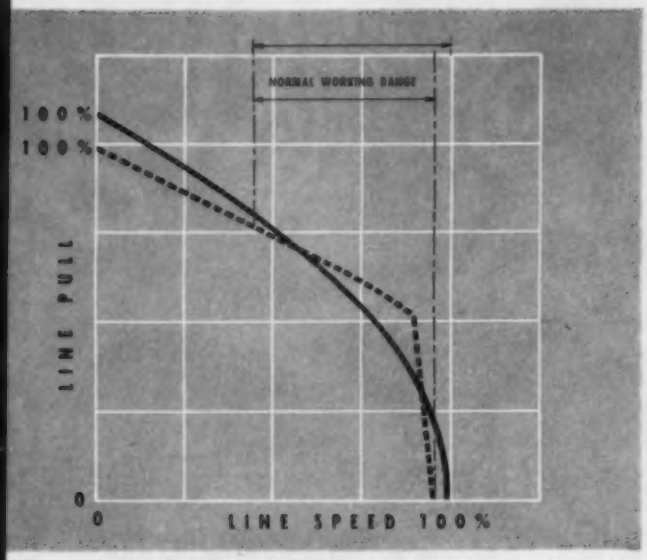
J. Earl Lamont, Bakerton, Pa., has been appointed a Pennsylvania state mine inspector. The appointment was made by Gov. Leader.

James W. Kinnear has been appointed executive vice president of U. S. Steel's Tennessee Coal & Iron Div., Birmingham, Ala. In his former post of vice president, operations, he is succeeded by William E. Crouch Jr. Mr. Kinnear succeeds John Pugsley, who became assistant executive vice president, accounting. Mr. Kinnear joined U. S. Steel in 1923 as a laborer at the Homestead Works. After serving in a number of capacities he was made assistant manager of operations in Pittsburgh in 1940. Seven years later, in 1947, Mr. Kinnear left U. S. Steel for the presidency of Firth-Sterling Steel & Carbide Co. He rejoined U. S. Steel in 1951 as assistant to the vice president, manufacturing. From September, 1951, until March, 1955, he was general superintendent of the Edgar Thomson Works. Next, Mr. Kinnear served as assistant vice president, engineering, at U. S. Steel from March, 1955, until he was moved to Birmingham.

Eugene E. Quenon has been appointed director of safety, Peabody Coal Co. Associated with the U. S. Bureau of Mines since 1929, he was district health and safety supervisor of District E, Vincennes, Ind., before the new appointment. With Peabody, Mr. Quenon will be located in the St. Louis office and will be in charge of all safety, in both strip and underground mines.

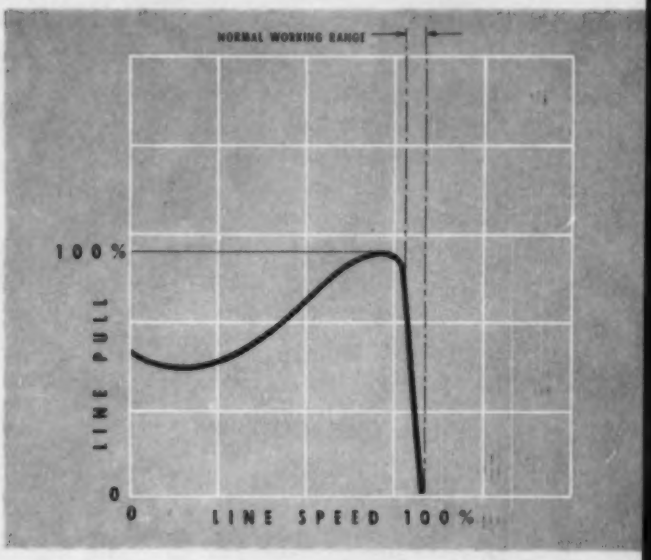
William E. Crouch, Jr., has been appointed vice president, operations, of U. S. Steel's Tennessee Coal & Iron Div., Birmingham, Ala. The appointment was effective April 1. Mr. Crouch succeeds James W. Kinnear Jr., who was appointed executive vice president of the division. Mr. Crouch joined the company in 1933

LIMA teams A.C. electric motor with torque converter for power-on-demand through wide operating range



Power Performance of LIMA'S New Optional Unit:

A.C. Electric motor with torque converter drive. (Diesel-torque converter curve (dotted line) shown for comparison.)
With this drive, even under extreme loading, the motor will pull down in speed only a very small amount. It can never be stalled. The line pull will constantly increase through a long pull down speed range, depending upon the load applied.



Power Performance of A.C. Electric Motor with Direct Drive:

The motor speed and torque vary as shown for line speed and pull

With a pull down in speed of only 3% to 5%, torque rises too fast. The motor will stall quickly after peak torque is reached. Workable speed range is small, stalls are frequent.

Lower First Cost — Reduced Maintenance

Now another quality-extra is available on all Lima machines. It's Lima's new electric power unit designed to give you full power-on-demand through a wide operating range.

Combining a single A.C. motor with a single stage torque converter, this drive matches, *electrically*, diesel-torque converter performance. It powers all motions and permits application of full power to any one motion as required. Under extreme loading, required power output is supplied at constant motor speed . . . and the motor can't stall or burn out.

The simplified electrical setup—with single A.C. motor and no complicated electrical controls—means lower first cost. Electrical maintenance is reduced to a minimum, and servicing does not require highly trained personnel.

Just check the performance curves above. You'll quickly see that Lima's quality-built electric power unit provides the ideal answer for *your* jobs calling for electrically powered machines. You'll get maximum power performance under all operating conditions. Get full details now from your nearby Lima distributor . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

CAPACITIES

Shovels ½ yd. to 6 yds. Cranes to 110 tons. Draglines variable. Smaller capacities available on rubber.

Baldwin-Lima-Hamilton Corporation Construction Equipment Division also manufactures Austin-Western Crushing, Washing and Screening Plants at its Lima, Ohio plant . . . and Madsen Asphalt Mixing Plants and equipment at its La Mirada, California, plant.

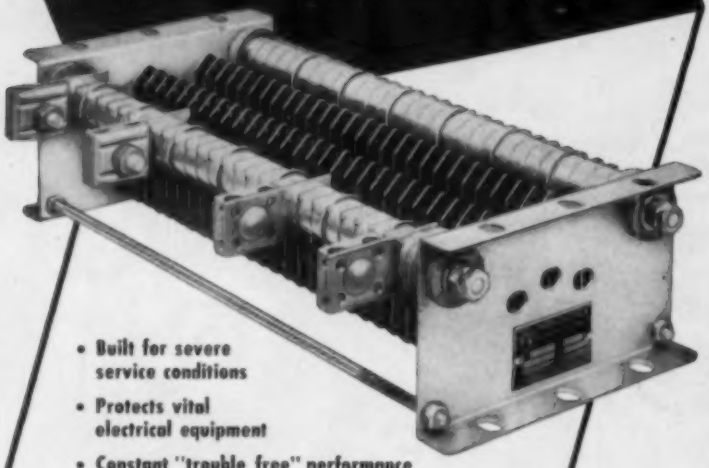
LIMA SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division — Lima Works

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Loewy-Hydropress • Madson • Pelton • Standard Steel Works

P-G Steel Grid Resistor
plays an *essential part*
in the production of COAL . . .

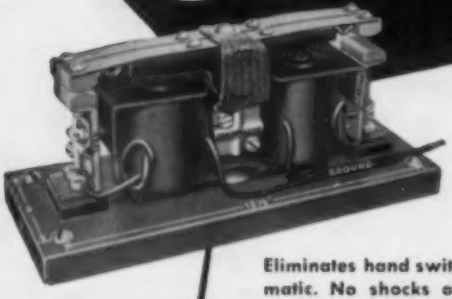


- Built for severe service conditions
- Protects vital electrical equipment
- Constant "trouble free" performance

These rugged nonbreakable units have proved their merit in all kinds of service for many years. Made of steel and mica, plus P-G unique and exclusive grid design, P-G Resistors are capable of protecting your most vital electrical equipment, even where service requirements are severe.

Designed to fit your present resistor space

P-G AUTOMATIC Transfer Switch



Single or double trolley and reel

Eliminates hand switches—entirely automatic. No shocks or burns to operator while changing from trolley to reel. Simple, safe, efficient, easy to install, can be mounted anywhere. For 250 to 600-volt service. Complete with cover.

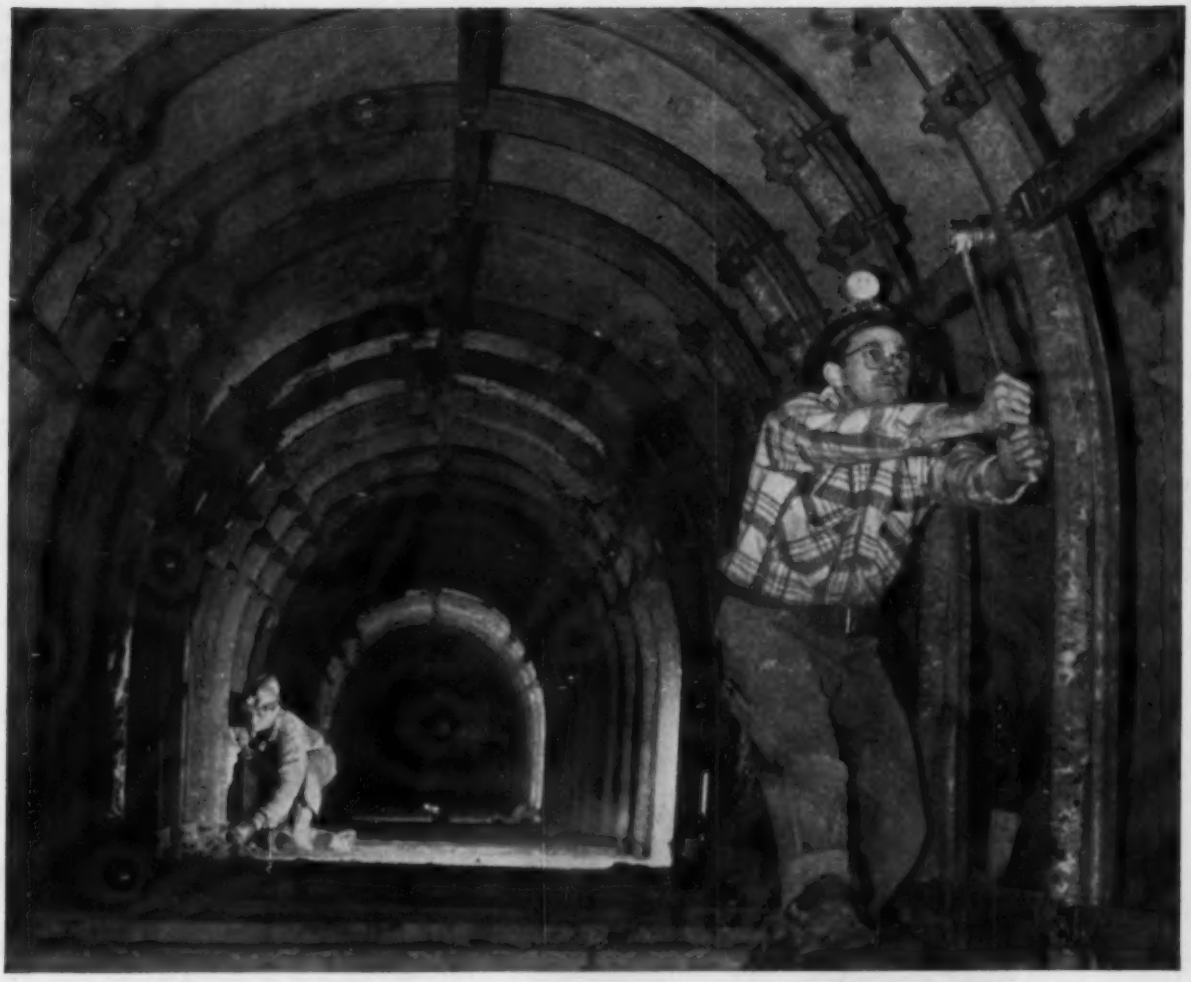
P-G
THE POST-GLOVER ELECTRIC COMPANY
•ESTABLISHED 1892•
221 WEST THIRD STREET, CINCINNATI 2, OHIO

Personal Notes (*Continued*)

as a clerk. Serving in various capacities at the Homestead Works, he rose to division superintendent. In 1952 he was transferred to the Edgar Thomson Works as assistant general superintendent. In March, 1955, he was appointed general superintendent.

John W. Broadway, vice president of the operating division, Bell & Zoller Coal Co., has been placed in charge of the division. Mr. Broadway has been associated with Bell & Zoller since 1920. He has held the position of secretary since 1940, and was elected a vice president in 1946.

C. Ward Padgett, former general superintendent of the Southern Illinois Div., Bell & Zoller Coal Co., has been named superintendent of the entire Illinois Div., a company unit comprising Zeigler No. 3, Buckhorn and Murdock mines. Mr. Padgett joined Bell & Zoller in 1948. Early in 1953 he was promoted from general superintendent of the Oriole and Moss Hill mines to general superintendent of the Zeigler and Buckhorn No. 2 properties. Before his association with Bell & Zoller, Mr. Padgett was employed by the Crescent Coal Co., Central City, Ky.



How quickly do Yieldable Arches pay for themselves?

That's the big question, and a natural one to ask before investing in a high-quality roof support like the Bethlehem Yieldable Arch.

The experience of one iron ore mine, extreme perhaps, may be an indication. The conditions were difficult, and the mine had been using timbers 14 in. and more in diameter, practically touching one another. One by one, these timbers failed in from 4 to 6 weeks.

So they installed Bethlehem Yieldable Arch sets in the caving area. Since installation, sets have yielded sufficiently to bring the roof under control, and mining operations have continued steadily. The operators have conservatively estimated that this installation paid for itself within six months!

While this case is hardly a typical one, this much is sure: in mines having heavy roof conditions the Yieldable Arch will give improved roof support, and will pay for itself gratifyingly soon. That's because no rigid support can indefinitely withstand the dynamic pressures caused by the weight and subsidence of the overburden. Periodic replacement of rigid supports is necessary. The Yieldable Arch, on the other hand, is designed to "give," thus allowing the ground to relax slowly and form its own pressure arch.

Yieldable Arch sets are recoverable, too, for use elsewhere in the mine. They are easy to install without special equipment or costly supervision. One of our engineers will be glad to talk with you about the Yieldable Arch; you can reach him through the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Sam Pulaski

(1833-)

Sam Pulaski is a wise old gent,
smart as any the Lord ever sent.
His job is the same day after day—
blasting down mountains the same old way.

But there's a story to this old guy
on why he'll use Austin 'til he die.
It started back before you and me,
as far back as eighteen thirty-three.

That was the year when Sam was the one
chosen to see the canal was done.
Canal was complete 'cept for a hill
bigger'n McKinley and steeper still.

Though Sam took the job he felt quite sad,
knew he needed more strength'n twenty had.
But Sam had heart and this was his tune,
"Get me some help and get it here soon."

As fate would be, Austin caught the cry
and filled his wagon near to the sky
with explosives aplenty, fuse galore
to trample trouble that lay before.

First went the mountain almost as fast
as Austin took to make up the blast.
Then boulders were made stones and stones sand
when Sam and Austin went through the land.

The canal was done in less'n a day
and still flows freely or so some say.
But this to Sam and his roughneck friend
was just the beginning, not the end.

To blast, to prime, to clip or to drill,
for every need Pulaski must fill
he's called on Austin since thirty-three,
quite a record I think you'll agree.

* * *

Now if you quarry or work a mine,
you must use products in our line.
So why not follow Sam's tested lead—
buy from Austin . . . everything you need.

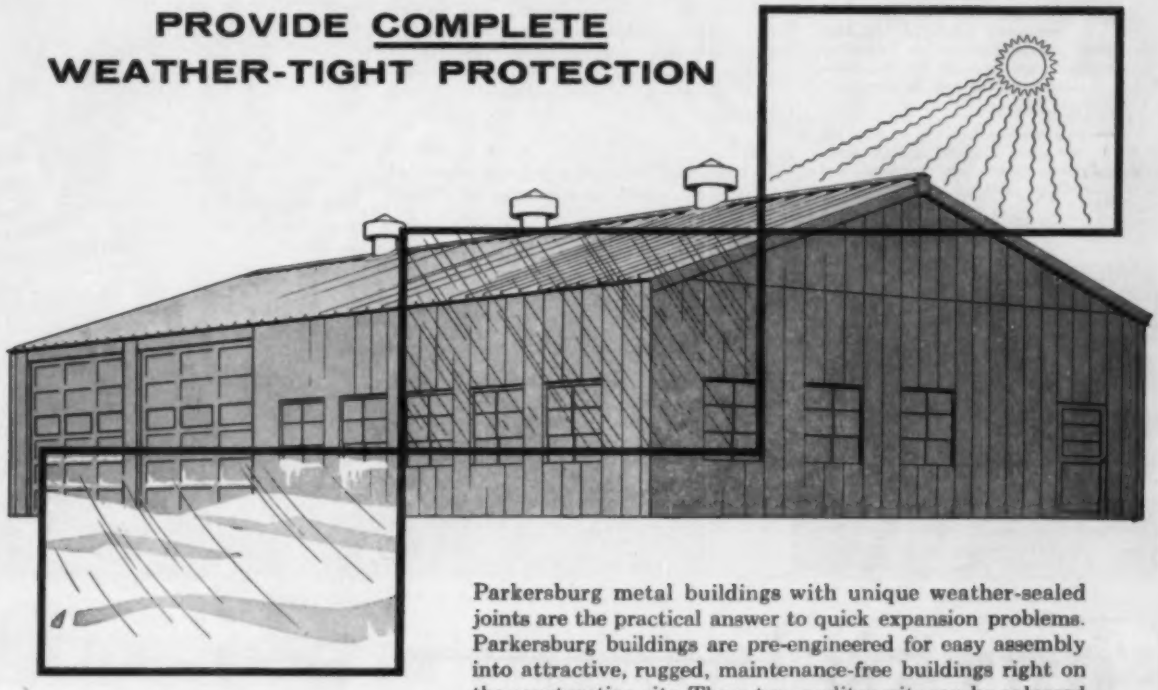
USED IN 1833 AUSTIN EVER SINCE

AUSTIN POWDER COMPANY
CLEVELAND 13, OHIO

quality

PARKERSBURG metal buildings

PROVIDE COMPLETE WEATHER-TIGHT PROTECTION



Parkersburg metal buildings with unique weather-sealed joints are the practical answer to quick expansion problems. Parkersburg buildings are pre-engineered for easy assembly into attractive, rugged, maintenance-free buildings right on the construction site. These top-quality units can be enlarged or moved to meet changing space requirements.

From tool sheds to large factory buildings Parkersburg installations are saving and serving in hundreds of different ways right across the board in industrial and commercial applications. It will pay you to look into this modern, low-cost way to provide additional facilities. Write to Department C-3.

The secret is in this unique "seven-fold" joint!

This panel locking arrangement provides a true weather-tight seal in a rigid joint. All Parkersburg metal buildings employ this feature as proof against driving rain, dust, snow, and high winds.

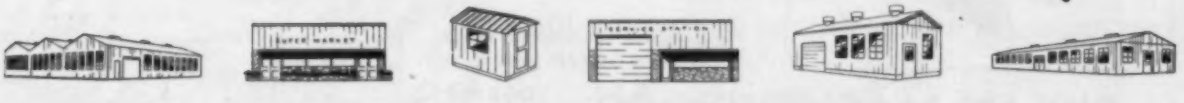
60 Years of Successful Service!

THE PARKERSBURG RIG & REEL COMPANY
Division of Parkersburg-Aetna Corporation
Parkersburg, West Virginia

Factory Locations:
Parkersburg, West Virginia
Pomeroy, Ohio
Coffeyville, Kansas
Houston, Texas

Building Division Sales Offices:
Dallas, Atlanta, New York, Chicago, Parkersburg

BUILDING PARKERSBURG DIVISION



"WISE IN THE WAYS OF METAL BUILDINGS"

HINGED PLATEGRIP
BELT FASTENER No. 500

FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/8" to 1/2" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular

ARMSTRONG-BRAY & CO.
5340 Northwest Highway · CHICAGO 30, U. S. A.

Among the Manufacturers

This was the news:

Dow Chemical Co. disclosed the completion of new quarters for its Highway & Construction Materials Dept. in Midland, Mich.

The department once known as the Dowflake Research Dept., will occupy a modern building equipped with up-to-date facilities for testing and research in the highway field. In 1931 the unit developed the calcium chloride stabilized road.

Addison Davidson, Jr., was appointed eastern district sales manager of Femco, Inc.

He moves from the position of sales engineer to conduct an expanded sales program of electronic communication and control systems from headquarters in Quakertown, Pa.

General Electric's Gene H. Whitfield was named a Carboloy carbide cutting tool sales representative.

Mr. Whitfieid, until recently associated with GE's Metallurgical Products Dept. marketing personnel development section in Detroit, will cover regions in several states south of Cincinnati.

William T. Ahlborg was appointed executive vice president and general manager of Denver Equipment.

At the same time Mr. Ahlborg announced the appointment of F. J. Griesemer as assistant general manager. Mr. Ahlborg joined Denver Equipment in 1938, was once vice president and secretary.

Seven new dealer service representatives covering 40 states, Hawaii, British Columbia, and Calgary, Alberta, were announced by the Construction Machinery Div., Clark Equipment Co.

Among the appointments: Cecil L. Starner, San Mateo, Cal., for Arizona, Nevada, and Utah; Richard G. Fuller, Overland Park, Kans., for Colorado and Wyoming; Charles R. Lewis, Birmingham, Ala., for Alabama, North Carolina, and Tennessee; Carl W. Osborne, Muncie, Ind., for Indiana, Ohio, Pennsylvania, West Virginia, Virginia, and Kentucky; Henry L. Spaulding, Southampton, Pa., for Pennsylvania.

Mellor W. Stevenson was made general manager of sales, Railway Div., National Malleable & Steel Castings Co., Cleveland.

Mr. Stevenson was succeeded by Howard Stark. Prior to the appointment Mr. Stevenson had been sales manager of the St. Louis office. His new headquarters are in Cleveland.

Sheldon H. (John) Ingram was appointed Pittsburgh branch manager by the Fairbanks Co., New York, N. Y.

In the post Mr. Ingram will be responsible for the sales of Fairbanks casters, hand trucks, wheels, and bronze and iron body valves. His territory includes western Pennsylvania, Ohio, West Virginia, and northern Kentucky.

Dorr-Oliver, Inc., appointed Glen G. Reed its director of Filtration Technical Div., and Glenn O. Wilson its director of the Industrial Technical Div.

In their new posts both men are responsible for the design, engineering and product development of all D-O equipment in their respective fields. Both will have headquarters in Stamford, Conn.

Clark Equipment Co. announced construction of a 300,000-sq ft facility in Chicago and a 63,000-sq ft building in Benton Harbor, Mich.

The Chicago building is slated for completion June 1, and is a one-story brick and steel structure in Chicago's Clearing Industrial District. A spur connects it with the Belt Railway. The facility at Benton Harbor is being built for expansion of the company's Construction

GUYAN
"Venta-Mine" FANS

sturdy, simple construction with a

The Ideal FAN *for economical low pressure mine ventilation.*

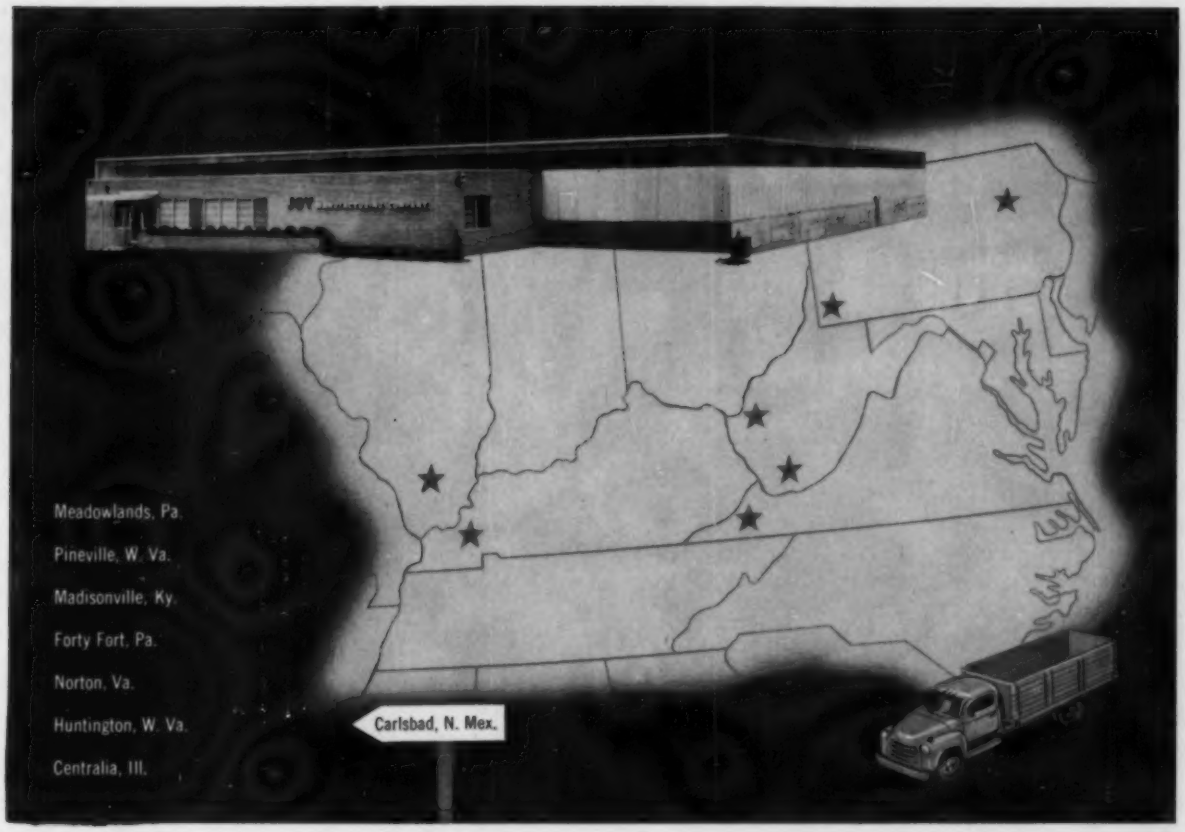
channel ring housing and electric welded angle cross members and vertical center angle supports.

Guyan Venta-Mine Fans are of

These Fans are available in four sizes—36", 48", 60" and 72". Blades on all sizes are cast aluminum. The 60" and 72" diameter fans have hubs of high grade cast iron so arranged that blades may be pitched at different angles. The 36" and 48" diameter blades are cast solid and therefore are not adjustable. The shaft extends each side of fan so that driver may be installed on either side.

For complete construction details write for GUYAN catalog.

GUYAN MACHINERY CO. LOGAN, WEST VA.



JOY puts renewal parts on the map for faster service

Careful packaging at Huntington, W. Va.

Small parts storage at Meadowlands, Pa.

Fast service is mighty important—especially when machines are down and production is stopped or seriously hampered. That's why Joy's new parts-service program includes fleets of regularly-scheduled trucks operating from strategically located parts depots.

These are modern depots—efficiently staffed by experienced sales and service representatives. All locations are adequately stocked with renewal parts suited to the areas they serve. Modern, automatic order writing and stock control systems are used . . . and each location is linked to all the others with open teletype circuits.

As these new stocking points are opened in Joy's rapidly expanding parts-service program it will be as though the factories were moved out into the mining fields. Get to know the follks at your nearest Joy parts-service depot—they are there to *serve you.*

Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.

Find out more at the COAL SHOW

WSW CHICAGO 1970

JOY . . . EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY

CONTINUOUS MINERS

LOADERS

DRILLS

CUTTERS

For safety, ease of installation and savings, specify

West Virginia Mine Roof Bolts

Proved in hundreds of mines, West Virginia fully assembled or cone neck Mine Roof Bolts eliminate lost time; afford maximum safety.

For prompt, personal attention or experienced Field Engineering Service, call, wire or write:

West Virginia Works
HUNTINGTON, W. VA.

CONNORS STEEL DIVISION
H. K. PORTER COMPANY, INC.

Manufacturers (*Continued*)

Machinery Div., which is being enlarged for the fourth time since 1954. Total space will reach 500,000 sq ft with the new addition.

Air Reduction Sales Co. appointed R. C. Wallace assistant regional sales manager of the southern region with headquarters in Louisville, Ky. A. C. Pease was named to succeed Mr. Wallace as Louisville district manager.

Mr. Wallace joined Air Reduction in 1929, was appointed assistant sales manager in 1936, district manager in 1947. Mr. Pease joined Airco in 1947 in Chicago, moved to Kansas City in 1951 as assistant sales manager. The company produces industrial gases and welding equipment.

Joseph E. Ward was appointed assistant manager of Pittsburgh coal sales by the Joy Mfg. Co.

Mr. Ward, from his Pittsburgh office, will direct and assist field representatives in the sales and service of Joy mining machinery. A former supervisory employee of the Tennessee Coal-Iron & RR Co., and of the Hudson Coal Co., Mr. Ward was also division sales manager for the National Mine Service Co. before joining Joy.

Dravo Corp., Pittsburgh, was licensed by Carl Schenck Co., Darmstadt, Germany, to manufacture Schenck-designed vibrating feeders, screens and conveyors.

William E. Connor, former vice president of engineering for the North Jersey Quarry Co., has been employed by Dravo as sales engineer for the new product line.

Hardie W. Beck was appointed sales manager for the Pittsburgh steel service plant operated by Joseph T. Ryerson & Son, Inc.

Mr. Beck was manager of the inside sales department for 9 yr before becoming a sales representative in 1950. He remained in that post until his new appointment as sales manager.

Philip P. Percich was appointed assistant manager of Goodyear Tire & Rubber's hose sales department, Akron, Ohio.

Mr. Percich joined Goodyear as a trainee in 1951, serving as a field representative for the Industrial Products Div., Chattanooga, Tenn., until 1954 when he was transferred to Jacksonville, Fla., in the same capacity.

Raymond E. Burton, assistant sales manager of the Koehring Div., Milwaukee, was named assistant director of marketing.

Mr. Burton's new duties will cover both market research and analysis. He became associated with Koehring in 1952, later served the company in Japan. He returned to the United States in 1955.

Joy Mfg. Co. announced the appointment of William R. Conrad as manager of the company's Contract Conveyor Div.

Succeeding G. R. Whithall, who retired, Mr. Conrad will manage a department which directs the engineering and selling of custom materials handling systems.

CARL: "A new flocculant doesn't interest me. I've been using the same one for 17 years."

FRED: "Is that so? I'm always looking for something better, Carl. That's why I tried Separan 2610."

Which is your reaction to the revolutionary flocculant, Separan 2610?

Let's listen in on a conversation between these two veteran coal processors: "I don't see why you're so resistant to change, Carl. The way I figure it, we've got to keep an open mind to improvements . . . like trying this new flocculant, Separan 2610®."

"Horsefeathers, Fred, I wouldn't go to the trouble."

"Trouble! You could hardly call it that, Carl. Think of the results! I'm using only 0.06 pound per ton of fines in my thickener. And the overhead is better than I've had in years. It's just a matter of using Separan properly."

"Properly ?"

"Well sure, Carl. You wouldn't drive a car like a horse and buggy. By using Separan the right way I've upped settling speed and get better dewatering on the overflow. The best part, of course, is that the overflow solids have been reduced."

"Mighty interesting. But . . ."

"But, but, but. No buts, Carl. Even if you have used the same flocculant for 17 years, you owe it to yourself and your company to try Separan."

NOTE: Separan 2610 is truly a revolutionary flocculant that, today, promises coal processors a future of vastly speeded-up settling and filtration. A sample and technical assistance can be obtained by writing THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. SC 1319F-1.

YOU CAN DEPEND ON DOW

Put WARN HUBS on your 'Jeep'®

APPROVED MODELS FOR ALL 4 W.Ds. TO 1½ TONS

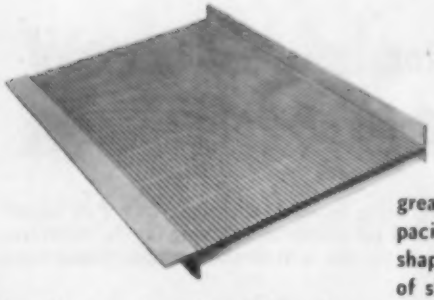
Stop Front Drive Wear in 2-Wheel Drive

Warn Hubs on your 4 w.d. will reduce front drive wear *in exact proportion to the miles you drive in 2 w.d.!* Watch your mileage, and you will find that you use 2 w.d. *most of the time.* With Warn Hubs, the front drive is "idle" in 2 w.d.—nothing turns but the wheels. There is no wear, no drag, no front gear whine. Your 4 w.d. has more pep, speed and power in high, and steers easier.

For maximum convenience, install Warn Lock-O-matics. They *automatically* engage the front wheels for 4-wheel drive, and disengage them for free-wheeling 2-wheel drive, *as you shift!* Warn Locking Hubs have easy fingertip controls. With either model, you'll get better, more economical service from your 4 w.d. See your local 4 w.d. dealer today. Free literature.

WARN MFG. CO. Riverton Box 6064-04, Seattle 88, Wash.

GIVES COAL A REAL CLEAN SCREEN!



You keep coal quality high when you give it a Hendrick Wedge Slot screening! Hendrick Wedge Slot has the kind of small openings that assure fine screening yet affords far greater draining and screening capacity. Profile bars are "precision shaped" to maintain uniform width of slot openings the entire length of the screen as wear progresses. For details on the Hendrick Wedge Slot Screen best suited to afford long life under your specific operating conditions, write Hendrick today.

Hendrick MANUFACTURING COMPANY
41 DUNDAFF STREET, CARBONDALE, PA.

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids • Hydro Dehazers • Petrochemical Column Internals

Current Coal Patents

By Oliver S. North

Centrifugal extractor with oscillating means therefor, W. G. J. Heckman (assigned to Klockner-Humboldt-Deutz A. G., Germany), Feb. 26, 1957. Design for a centrifugal apparatus useful for dewatering sludges and slurries, particularly slurries of coal fines. The coal-laden slurry is placed in a sieve drum, where it is thrown by centrifugal motion against the sieve. A motion imparted to the sieve causes the layer of solid particles to travel upward, while the water drains through the sieve. A layer of dry material leaves the drum continuously and drops into a collecting bin. No. 2,782,930.

Cutter head for boring-type continuous miner, R. C. Lundquist (assigned to Goodman Mfg. Co.), Feb. 26, 1957. An improvement for a mining machine of the McKinlay type consists of a pair of arms which rotate, preferably in the same plane, in opposite direction to a similar pair of rotating arms. Thus, the overlapping bores have a relatively large width or base as compared to their height, which provides room for placing timbers around the machine. This apparatus is especially desirable for working thin seams. No. 2,783,036.

Variable height boring-type continuous mining machine, F. Cartlidge (assigned to Goodman Mfg. Co.), Feb. 26, 1957. As an improvement for a mining machine of the McKinlay type, the upper cutter bar is vertically adjustable independently of the lower cutter bar. A minimum of cutter-chain take-up adjustment is required when the upper cutter bar is adjusted for varying heights of cuts. The bore has approximately vertical side wall portions to permit upright timbering to be set closely adjacent to the side walls. No. 2,783,037.

Oscillating burster-cone assembly for boring-type miner head, B. F. Tracy (assigned to Goodman Mfg. Co.), Feb. 26, 1957. An improved construction and arrangement for a burster cone which is non-rotatable when inserted into the working face, and for a rotatable pilot bit to operate in advance of the non-rotatable cone. The assembly has improved bursting and material dislodging action. No. 2,783,038.

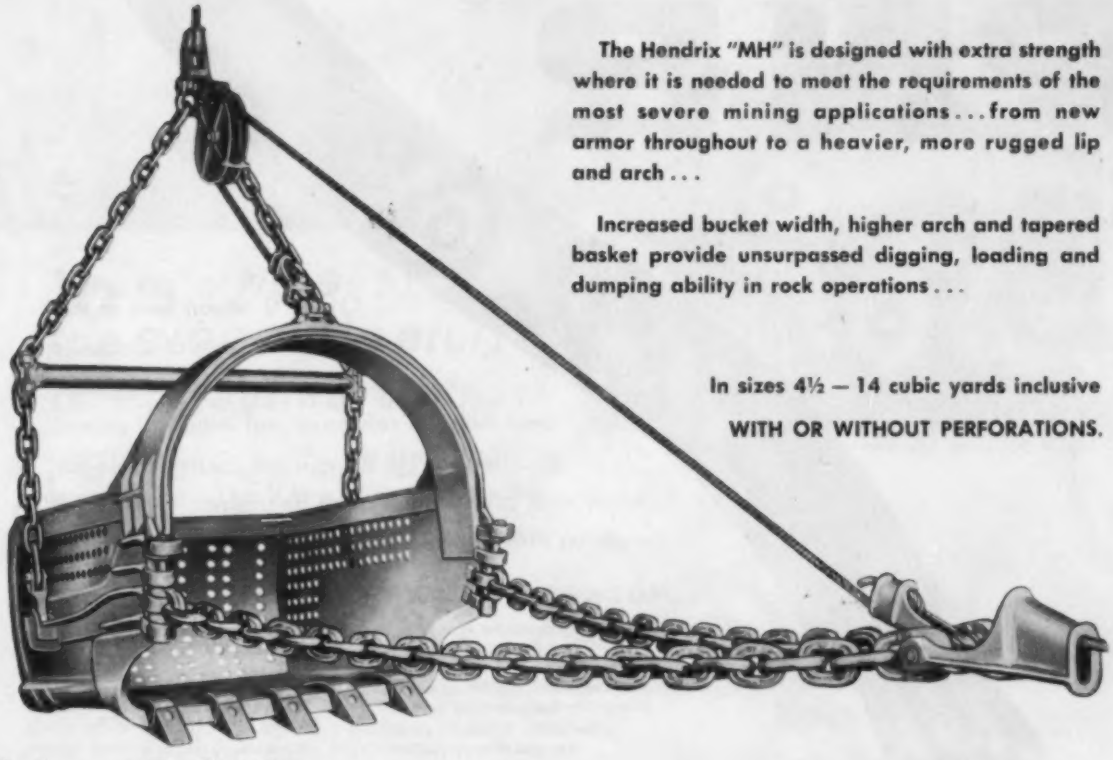
Expander nut having three surfaces of different inclination, W. J. Lewis and E. F. Huston (assigned to Ohio Brass Co.), March 5, 1957. An improved roof-bolting expansion bolt possessing preferably three zones, each having a separate function. The manually collapsed bolt is installed in a hole having a diameter slightly greater than that of the bolt, and securely seated by upward pressure applied to the stud. No. 2,783,673.

Re-utilizable blasting apparatus assembly applicable for blasting in coal mines, K. A. Smith (assigned to Imperial Chemical Industries Ltd., Great Britain),

Advanced-design features of...

the new "MH" HENDRIX Heavy Duty Mining Bucket

KEEP PRODUCTION UP ...and COSTS DOWN



The Hendrix "MH" is designed with extra strength where it is needed to meet the requirements of the most severe mining applications... from new armor throughout to a heavier, more rugged lip and arch...

Increased bucket width, higher arch and tapered basket provide unsurpassed digging, loading and dumping ability in rock operations...

In sizes 4½ — 14 cubic yards inclusive

WITH OR WITHOUT PERFORATIONS.

See us at The Coal Show
May 13-16 Booth #830

HENDRIX MANUFACTURING COMPANY, Inc.

MANSFIELD, LOUISIANA

Hendrix Lightweight Dragline Buckets

This is One foot of Rockbestos PNR®*

Over 10 million feet of this 600 VOLT Control Cable is already in use in hundreds of utilities, steel mills, oil refineries and industrial plants. Rockbestos PNR is the ideal control cable for many coal preparation plant operations. Get all the details on PNR — write now for the new, free catalog.

ROCKBESTOS PNR FEATURES INCLUDE:

46% smaller in area . . .
28% smaller in diameter . . .
than conventional control cable.

Use smaller conduit and fittings or put more conductors in existing conduit.

Lighter, easier to handle, store, ship, pull through conduit.

Dielectric breakdown . . . over 40 times operating voltage.

Rated 600 volts . . . conductor operating temperature 167°F.

Flexible from 167° to −67°F.

No cracking!

WRITE TODAY FOR COMPLETE DETAILS ON ROCKBESTOS PNR.

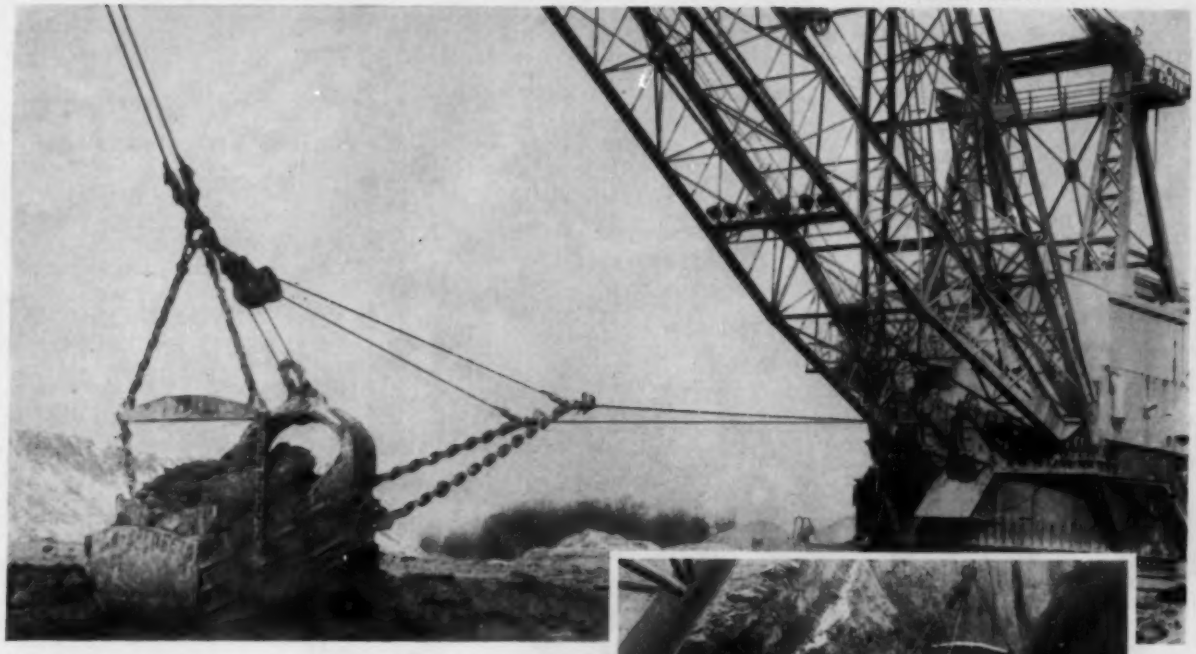
ROCKBESTOS PRODUCTS CORP.
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH
ST. LOUIS • LOS ANGELES • OAKLAND, CALIFORNIA
NEW ORLEANS SEATTLE

*P — polyethylene, N — nylon, R — Rockhide (PVC)

"Page is the *BEST DIGGING BUCKET* I've ever seen"

... ANGUS BAIN
FAIRVIEW COLLIERIES,
DANVILLE, ILLINOIS



30 yd. Page Automatic digging to depths up to 100 ft. gets maximum loads each cycle.

There's No Substitute for DIGGING ABILITY in a Dragline Bucket

Experienced dragline men like Angus Bain of Danville's big Fairview Collieries, know that the only way to judge a dragline bucket is by its *digging ability*. Digging ability means faster loading of maximum loads, more cycles per hour and greater production per shift — the real payoff of dragline equipment.

Page Automatic Buckets lead the field and are the choice of production-conscious buyers because they have the built-in automatic action that makes them start digging sooner, fill faster and carry out more yardage than any other bucket.

Page Automatic Buckets have often been imitated, but their most important feature — *digging ability* — has never been equalled. You can improve the productive capacity of any machine by putting it to work with a Page Automatic ... the bucket that's built to dig better.

Want proof? We can arrange a demonstration of a Page Automatic on your own machine. You be the judge of its digging ability and performance. Write for details today. There's no obligation.

PAGE ENGINEERING COMPANY
CLEARING P.O. • CHICAGO 38, ILLINOIS

Page

Automatic Dragline Buckets
Walking Draglines

If it's a PAGE ... *It* DIGS

B-3110.

Coal Patents (*from p 160*)

March 5, 1957. Design for an improved gas-containing blasting assembly. The device is said to eliminate the hazard of accidental discharge by an ignition of fire-damp. No. 2,783,712.

Hydraulic take-up for a conveyor, J. J. Slomer (assigned to Goodman Mfg. Co.), March 19, 1957. An improved hydraulic tensioning device for maintaining tension on the conveyor chain of a conveyor used with mining machines. No. 2,785,789.

Cutter bit and mounting therefor, R. C. Lundquist (assigned to Goodman Mfg. Co.), March 19, 1957. An improved mounting for a cutter bit for a mining machine is provided with a stripper tail which will remove material behind the cutter bit. No. 2,785,883.

Coal-loading machine, J. B. McDade, March 5, 1957. A simple, efficient and flexible power coal loader and related power plant for use in loading coal in thin seams. The shovel reciprocating and rotating mechanisms are provided with separate hydraulic power units. The machine is movable under its own power and has increased load capacity. No. 2,783,902.

Rotary mining-machine cutter head with rear helically extending transverse opening, C. E. Compton, March 12, 1957. Design for a self-cleaning mining machine head wherein the mined material within the head is forced into contact with the face of the bore, causing it to be effectively dislodged for delivery to the conveyor. This permits operation of the head at an increased rate of speed. No. 2,784,955.

Scraper buckets, J. S. Thompson (assigned to Coal Industry (Patents) Ltd., London, England), Nov. 13, 1956—A design for an improved scraper or slusher bucket to be used in strip mines for rapid removal of overburden from coal beds. No. 2,770,058.

JEFFREY

type 6F AERODYNE® fans

For light and medium-duty mine ventilation up to 5" W.G. pressure, Jeffrey offers this new fan. It combines low cost with high efficiency, and includes the fine engineering features of all Aerodyne fans, first introduced by Jeffrey in 1936.

Proper coursing of air through a mine, or in an industrial plant, is a problem that can be answered only by experience and scientific knowledge. Jeffrey ventilating engineers can draw upon forty-six years of such experience to assist you in selecting the type and size of fans and blowers best suited to your requirements.

Catalog 901 describing this equipment will be sent upon request to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

EQUIPMENT APPROVALS

Ten approvals of permissible equipment were issued by the U. S. Bureau of Mines during February.

Joy Mfg. Co.—Types 10SC5BPE-1 (modified by SBM9018) and 10SC-5BPXE-1 (modified by SBM9019) cable-reel shuttle cars; five motors, two 7½-hp and three 15-hp, 250 v, DC. Approval 2-1209, Feb. 1.

Joy Mfg. Co.—Type X-847-6 Model "C" 30-in belt-conveyor drive unit; one motor, 7½ hp, 250 v DC. Approval 2-1210, Feb. 1.

Joy Mfg. Co.—Types 10SC5BPE-1 (modified by SBM8897) and 10SC-5ABPXE-1 (modified by SBM8898) cable-reel shuttle cars; five motors, three 15-hp and two 15-hp, 250 v, DC. Approval 2-1211, Feb. 6.

Acme Machinery Co.—Type HSJ-4WD drill truck; one motor, 20-hp, 230 v, DC. Approval 2-1212, Feb. 6.

The Long Co.—Type D2382W400 conveyor; one motor, 5-hp, 230 v, DC. Approval 2-1213, Feb. 7.

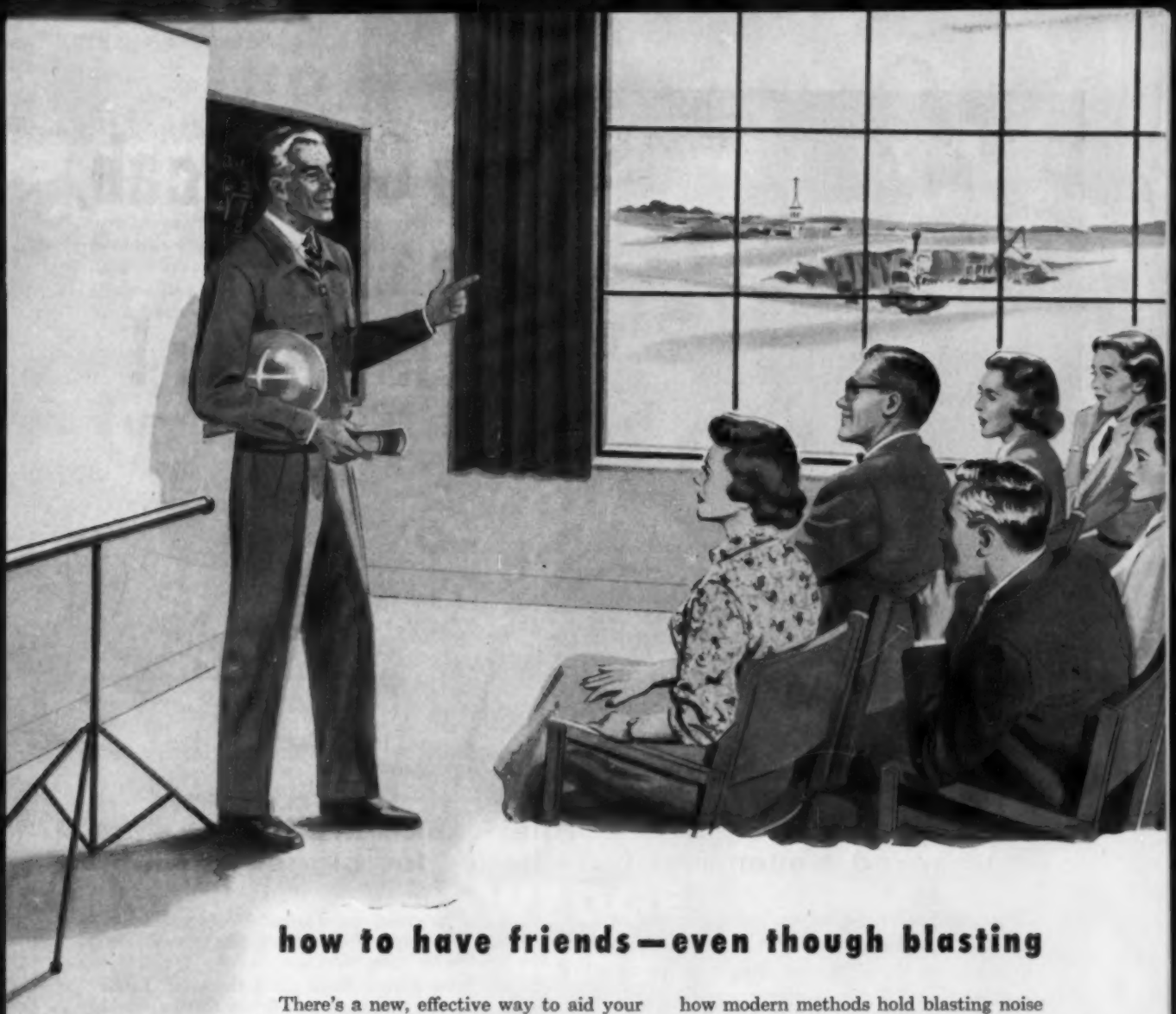
Goodman Mfg. Co.—Type 93-36 Ropex conveyor; five motors, two 25-hp, two 10-hp and one 3-hp, 230 v, DC. Approval 2-1214, Feb. 8.

The Long Co.—Type D2387 coal drill; one motor, 5-hp, 230 v, DC. Approval 2-1215, Feb. 14.

Joy Mfg. Co.—Type AD10 auger drill; one motor, 40-hp, 250/500 v, DC. Approvals 2-1216 and 2-1216A, Feb. 14.

Joy Mfg. Co.—Type 14BU9-3AF loading machine; five motors, four 15-hp and one 4-hp, 500 v, DC. Approval 2-1217A, Feb. 15.

In addition to the above permissible equipment, symbol 123-BM was assigned to the Carol Cable Co. Div. of Crescent Co., Inc., to identify cables that have been accepted by the bureau as being flame resistant.



how to have friends—even though blasting

There's a new, effective way to aid your public relations in communities where you are blasting. It's the interesting, informative sound film, in color, entitled, "*We're Blasting Near You.*"

When you show this film to PTA meetings, service clubs and other civic organizations, you can prove that you're a good neighbor . . . that blasting, while necessary, is nothing for people to be alarmed about.

"*We're Blasting Near You*" shows how modern millisecond delay techniques eliminate old-fashioned, jarring explosions . . . how modern methods hold blasting noise to a muffled minimum, and make vibration unnoticeable. In a friendly, noncommercial way, the movie shows your efforts to be a good citizen in the community.

You can show this movie to any age group. It is accompanied by a kit containing news releases, sample speeches, safety posters and other helpful material which will make your public relations meeting a success. Write for available dates, and show "*We're Blasting Near You*" in your community!

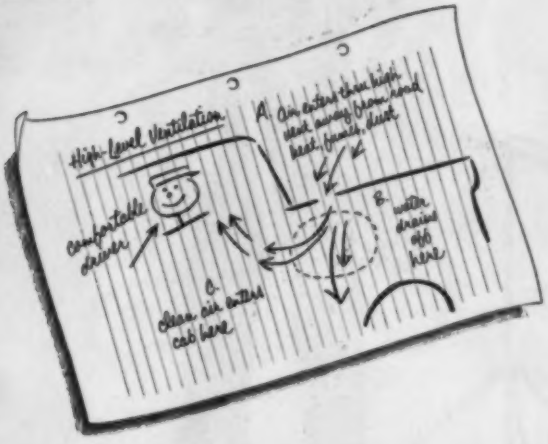
Technical Customer Service Section

ATLAS POWDER COMPANY

WILMINGTON 99, DELAWARE

offices in principal cities

in a Chevy cab, even the air is better!


High-Level Ventilation
A. Air enters above high dash away from road heat, fumes, dust
Comfortable driver
B. Water drained off here
C. Clean air enters cab here

...more evidence that Chevrolet Task·Force Trucks are engineered better and built better for bigger savings!

These cab features give you extra comfort and safety behind the wheel, extra savings on truck maintenance. And they're proof that the most modern trucks for your money are Chevrolets!

The drawing "doodled" above shows how Chevy's High-Level ventilation provides a *comfortable* interior . . . and the numbers in the big picture point out other advantages equally as good to have around you when you haul! They include:

1 *A roof that's specially built for safer, more comfortable hauling.* Sturdy all-steel construction adds to safety; roof's unique inner reinforcement insulates the overhead against heat.

2 *A gleaming, durable baked enamel outside finish.* Here's the reason your Chevy's exterior will resist wear better, look like new longer! This handsome finish is available in a wide variety of colors.

3 *A Nu-Flex seat that beats the bumps!* Deep-comfort coil springs, metered air shock damping and 3-way adjustment let you take it easy on tough jobs!

4 *A cab that's rustproofed to last!* Doors and similar surfaces are rustproofed on the inside as well as on the outside by immersion.

5 *Concealed Safety Steps for convenience.* Inside each cab door, they give you firmer footing, make entering or leaving the cab easier and safer.

6 *An undercoated floor, cowl side panels and fender flanges.* Virtually all exposed surfaces on the underside of the cab are protected by an anti-rust coating.

7 *A non-glare instrument panel to make driving safer!* The textured finish on upper portion of Chevy's instrument panel reduces blinding sun reflections, minimizes eyestrain.

8 *A reliable 2-speed electric windshield wiper* on each side.* Powered by electricity, their action remains *constant* under all conditions.

Such advantages as these (we've shown only a few) combine to make *everything* better in a 1957 Chevrolet truck! You'll see for yourself when you visit your Chevrolet dealer's. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

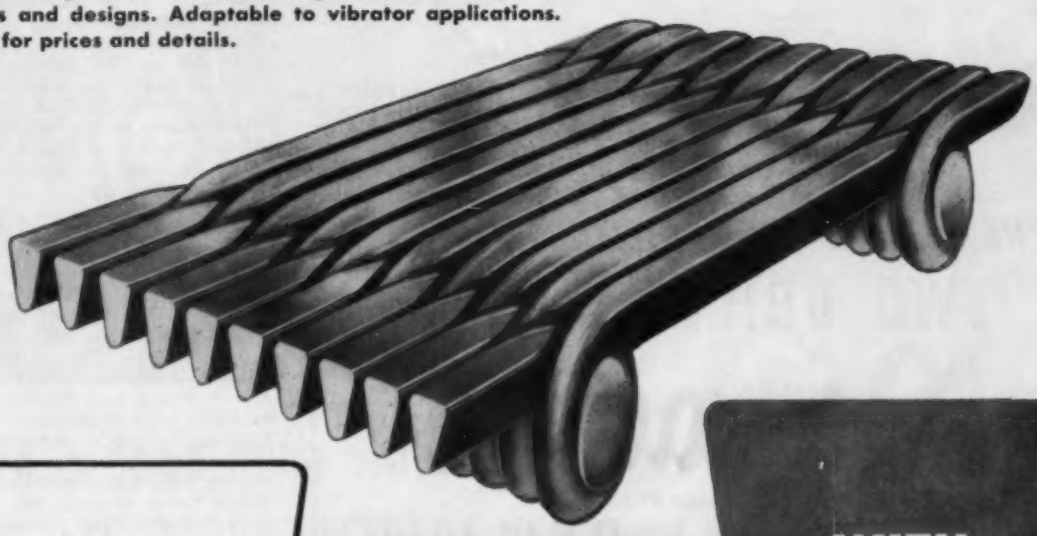
**Standard in Series 5-6-7-8-9-10000 models.*

. . . biggest sellers because they're the biggest savers! CHEVROLET

CHEVROLET TASK·FORCE 57 TRUCKS

HERE IS A NEW PRODUCT!

A heavy wire preparation screen especially designed for extended life in abrasive applications. Already tested and proven in many capacities, this newly designed screen possesses the necessary construction features to easily maintain openings from ½ inch to as close as 1 m.m. Available in many metals. Furnished in guard bars and special shapes and designs. Adaptable to vibrator applications. Write for prices and details.



NEWEST TYPE OF

Kleenslot WEDGE WIRE HEAVY DUTY SCREEN

WITH *I. F. A.

*INDEPENDENT FLEXING ACTION —Unique construction permits individual wires to "flex" independently for greater screening capacities and abilities while maintaining "rigid" requirements.

WEDGE-WIRE CORPORATION
GAS STREET AND NICKEL PLATE R. R.
WELLINGTON, OHIO

Books for Coal Men

Oil Shale

Description and Operation of the N-T-U Retort on Colorado Oil Shale, by J. R. Ruark, K. L. Berry and Boyd Guthrie. This report describes the experimental work in processing oil shale and the operating problems. *R. I. 5279. Publications-Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.*

Analysis of Crude Oil Shale, by C. S. Allbright, R. A. Van Meter, G. U. Dinneen and J. S. Ball. This report gives the results of analyzing three groups of crude oil shales by the Bureau of Mine procedure: (1) Oils produced by standard Fischer assay determinations on shales from Brazil and the United States; (2) oils produced from Brazilian shale by different retorting methods and (3) oils from high-temperature retorting of Colorado oil shale in the entrained-solids retort. *R. I. 5286. Publications-Distributions Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.*

Technical Catalog

A new, revised catalog of Lefax Technical Data Books is now available. These pocket-size reference books cover all branches of engineering. Each has about 140 pp. of data. *Catalog free, Lefax Publishers, Philadelphia 7, Pa.*

NEW SPEED AND DRILLING ECONOMY

TWO DRILLS IN ONE

Parmanco

Model 51-55 Dual

COAL DRILL

"It's a life saver to us" says W. V. Hartman, Supt. Victoria Coal Corp.

Working ahead of an 8-yard loading shovel in 4-ft. coal, speed is essential.

Traction, hydraulic and electrical system operated by 106 hp engine. Push button controls. Drills can be operated singly or in tandem.

CUTTINGS SHIELD and GUIDE—completely automatic

Blast holes, as seen in the picture, are kept clean from cuttings dropping back down the hole. A dam is formed about each blast hole excluding casual surface water.

• SEND FOR COMPLETE DETAILS

PARIS MANUFACTURING CO. PARIS, ILLINOIS

Obituaries

Robert B. Baker, president of the Sterling Coal Co., New York, N. Y., died March 10 in New York. He was 90. In addition to being president of Sterling, Mr. Baker was chairman of the board of Stineman Coal & Coke Co. Born in London, England, in 1867, he was the descendent of 18th Century Massachussetts settlers. In 1887, in Philadelphia, he was employed by Robert Hare Powel and the Sterling Coal Co. By 1889 he had become the company's secretary and treasurer. Three years later, in 1902, he was elected vice president. In 1908 he was elected president. Under Mr. Baker's leadership Sterling became one of Pennsylvania's most progressive coal mining companies. As an active member of Pennsylvania's National Guard for much of his life, Mr. Baker held the title of Colonel all his life. It was a rank bestowed on him in 1895 by Pennsylvania's late Gov. Hastings. In 1934 Mr. Baker was elected an honorary life member of the Guard. Among his business activites, in addition to the posts above, Mr. Baker had been president and director of the Bakerton Supply and had helped organize the Powelton Barge Co., which operated a fleet of coal barges in New York's harbor for a number of years. He was also founder of the Phosphor Bronze Co., a Philadelphia company.

Arthur L. Bastin, 58, of Kona, Ky., and owner of the Elkhorn Coal Co., died March 9 in Lexington, Ky. Mr. Bastin, with his father Sam L. Bastin, at one time operated the Elkhorn Collieries, Thornton, Ky.

J. Walter Hurley, consultant and former vice president and general manager of the North American Coal Corp., died February 24 in Beckley, W. Va., his home. He was 55 yr old. Mr. Hurley began a career in coal more than 40 yr ago when he began working as a trapper boy and spragger for the Mohawk Coal & Coke Co., Mohawk, W. Va. Later, he became purchasing agent for the Thacker Coal & Coke Co., Thacker, W. Va. After holding a number of various jobs he joined the Welch Pocahontas Co. in 1933 as superintendent. Later, after serving Koppers Coal Co. as efficiency expert, he was hired in 1941 by the Red Parrot Coal Co., Prenter, W. Va., as safety director. In 1951 he was named superintendent of the Red Cedar mine and later in the year, general superintendent of the C. H. Mead Coal Co., a subsidiary of North American Coal Corp. In 1953 Mr. Hurley was elected vice president in charge of production for the C. H. Mead Company. He retired as an active operating executive 2 yr later, in 1955, but was retained as a consultant.

What does mine water do to USS NATIONAL* Polyethylene PIPE?

Nothing. In spite of its ravenous corrosive properties, mine water has no effect on NATIONAL Polyethylene Pipe. That's why it's the perfect pipe for mine drainage systems. However, polyethylene pipe offers more than resistance to acids, alkalis, salts and other chemicals. It offers economy and speed of installation. Light and flexible, it unrolls like hose, turns corners, goes over and under obstructions, requires very few joints.

NATIONAL Polyethylene Pipe is tough. It takes rough handling without cracking, even at sub-zero temperatures. In fact, it stays tough and flexible over its entire working range from minus 90°F. to plus 120°F.

In addition to all the advantages it offers, NATIONAL Polyethylene Pipe is the *most economical* pipe that can be effectively used for mine drainage.

Manufactured from *pure 100% "on grade" polyethylene raw material*, NATIONAL Polyethylene Pipe is available in sizes from ½-inch to 6 inches in diameter, in a variety of wall thicknesses. For complete information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

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You'll find our May Show Report a fully illustrated, fast-reading digest of equipment highlights, a practical exhibit guide you'll want to check before you take off for Cleveland. Supplementing this special Show write-up will be the complete advance program of convention papers and advertising of exhibiting manufacturers.

EQUIPMENT REPORT

from your Coal Show visit

Also in May COAL AGE . . . a full complement of articles keeping you up-to-date on new mining properties, significant industry developments and trends. Plus, of course, COAL AGE's regular monthly departments.

A HEARTY WELCOME awaits you at COAL AGE's AMC exhibit. Editors and others of our staff will be on hand, and we hope you'll stop by and say "hello." Booth 1520, in the passageway to the lower exhibit area.

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AMERICAN Brake Shoe COMPANY

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A Progress Report on Faculty Salaries:

UP . . . But Not Nearly Enough

THE CHART on this page provides a report of the progress being made in solving a problem of crucial importance to every American. The problem is that of seeing that college and university faculty members get decent salaries.

This new chapter, which brings the story forward two years—from 1954, when it was last dealt with in this series of editorials, through 1956—has a decidedly cheering element. For in the last two years faculty salaries have made real headway.

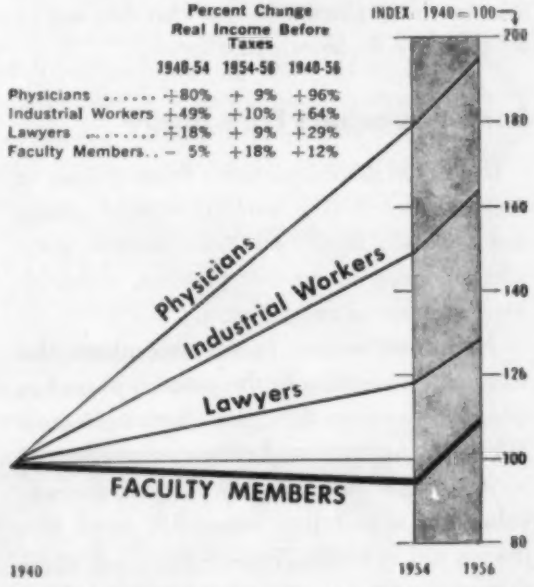
Two Years of Improvement

In 1954, in terms of what their salaries would buy, faculty members as a whole were actually worse off, by 5%, than they had been fourteen years earlier. As the chart shows, over the same period the real income of the average industrial worker had increased by almost half. And, in what it would buy, the income of the average physician, with professional training comparable to that of the average faculty member, had jumped by 80%.

In 1956, however, the average faculty salary would buy about 12% more of goods and services than it would in 1940. Relative to where they were two years before, faculty salaries showed a larger gain over the two years than those of any of the other groups whose salary progress is charted.

This movement of faculty salaries in the right direction has many contributing causes. The biggest single boost was given by the great Ford Foundation gift of half a billion dollars to our colleges, universities, and hospitals, almost half of which was ear-marked for faculty salary increases. Gifts from business firms have also

What is Happening to College Faculty Salaries



DATA: Council for Financial Aid to Education, U. S. Dept. of Commerce, U. S. Dept. of Labor, National Association of Education Research Dept., McGraw-Hill Dept. of Economics

helped a lot. And so, in many cases, have stepped-up money-raising campaigns by alumni groups and cooperative regional and state groups of colleges.

Still a Long Way to Go

However, faculty salaries started their ascent from such a dismal depth that they still have a long, long way to go up before there is room for the comfortable conviction that they are fair, or even safe, from the standpoint of protecting the nation's vital interests. It still remains possible to find many shocking companion pieces for the following incident recently reported to a McGraw-Hill executive group, working on problems of financial aid to higher education, by the president of an illustrious small liberal arts college.

"The recruiting officer of one of our large industrial companies came to our campus a few weeks ago," the college president said, "and offered five of our seniors higher salaries to start working for that company when they are graduated next June than the salary received by any member of our faculty. And the seniors, of course, promptly went to their professors to seek advice on whether or not they should accept. It doesn't take much imagination to see what this sort of thing does to the morale of a faculty."

Senior Teachers Fare Badly

One of the more devastating things it does, of course, is to make the more experienced college and university faculty members receptive to the idea of going to greener pastures, currency-wise, in business and industry.

For these senior faculty members the financial pounding in the past 16 years has been even worse than the chart indicates. While the average real salary gain reported by the chart has been 12%, the average salary of a full professor still buys less than it did in 1940. This is because most of the salary increases have gone to beginning instructors, for whose services industry has been providing the sort of competition reported by the liberal arts college president.

And it creates this financial lackluster of posts as senior college faculty members right at the time their services are needed more than ever to handle the oncoming flood of college and university students. Between now and 1970 college and university enrollment is expected to double.

What is Needed Now

What is clearly needed is a continuation and intensification of the drive to increase their salaries to a point where college and university faculty members will be sharing somewhere near fully in the general prosperity of the nation. It could be counted good progress in this direction if over the next two years faculty salaries on the average were to go up another 12%, with most of the increase concentrated in the senior faculty ranks. And this can be made possible only through more outside contributions.

There is reason to be encouraged by the progress that has been made over the past two years in bailing college and university faculty members out of the terrible financial hole into which they were allowed to slide. But there is the most urgent occasion to keep at it and harder.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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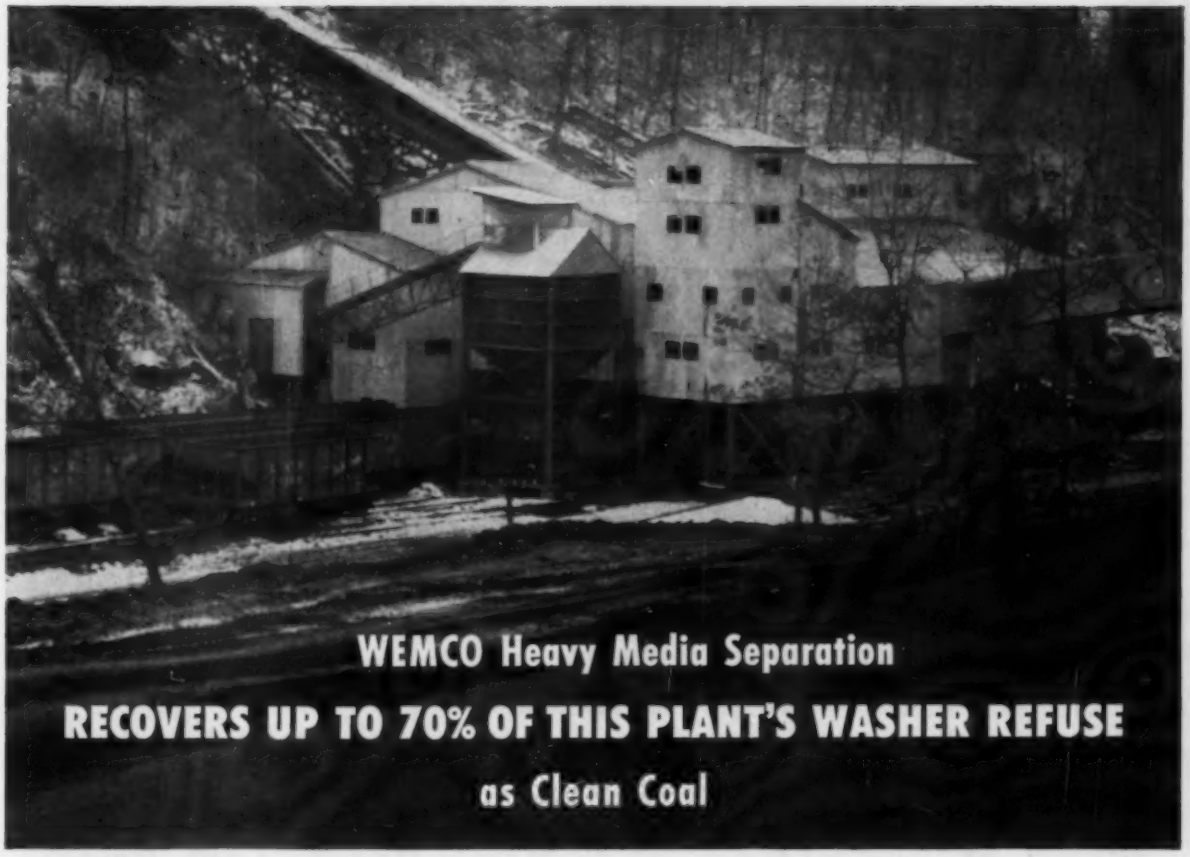

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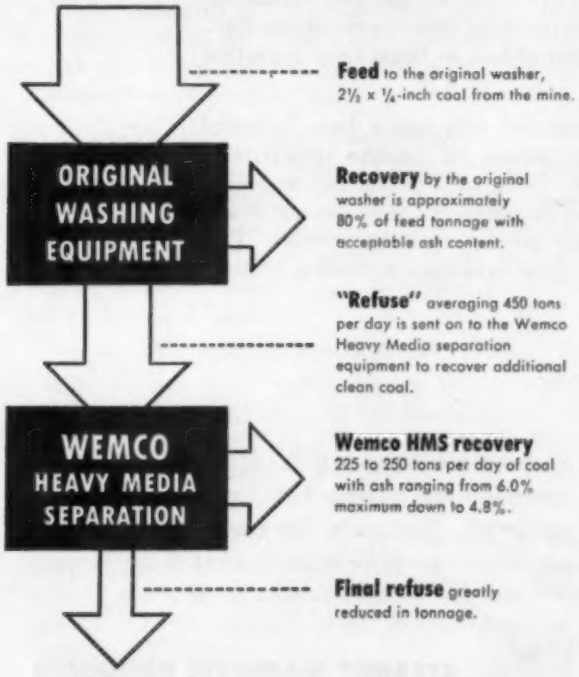
RECOVERS UP TO 70% OF THIS PLANT'S WASHER REFUSE
as Clean Coal

The Jewell Ridge story at a glance



Feed to the original washer, 2½ x ¼-inch coal from the mine.

Recovery by the original washer is approximately 80% of feed tonnage with acceptable ash content.

"Refuse" averaging 450 tons per day is sent on to the Wemco Heavy Media separation equipment to recover additional clean coal.

Wemco HMS recovery 225 to 250 tons per day of coal with ash ranging from 6.0% maximum down to 4.8%.

Final refuse greatly reduced in tonnage.

"We are now recovering 225 to 250 tons per day of clean coal that was formerly lost," says the Division Engineer at Jewell Ridge Coal Company in Tilford, Kentucky.

Lab analysis at Jewell Ridge had shown a large loss of coal in the refuse of the original washing plant. A Wemco Heavy Media plant (of Mobil-Mill design) was added to treat the large volume of refuse. It was expected to recover a coal of 11 percent ash, saleable at a low price. But in actual operation, the Wemco Heavy Media equipment has been recovering 225 to 250 tons per day of coal in a range from 4.8% ash to 6.0% maximum. (Jewell Ridge Coal Company has now ordered a second Wemco Heavy Media plant.)

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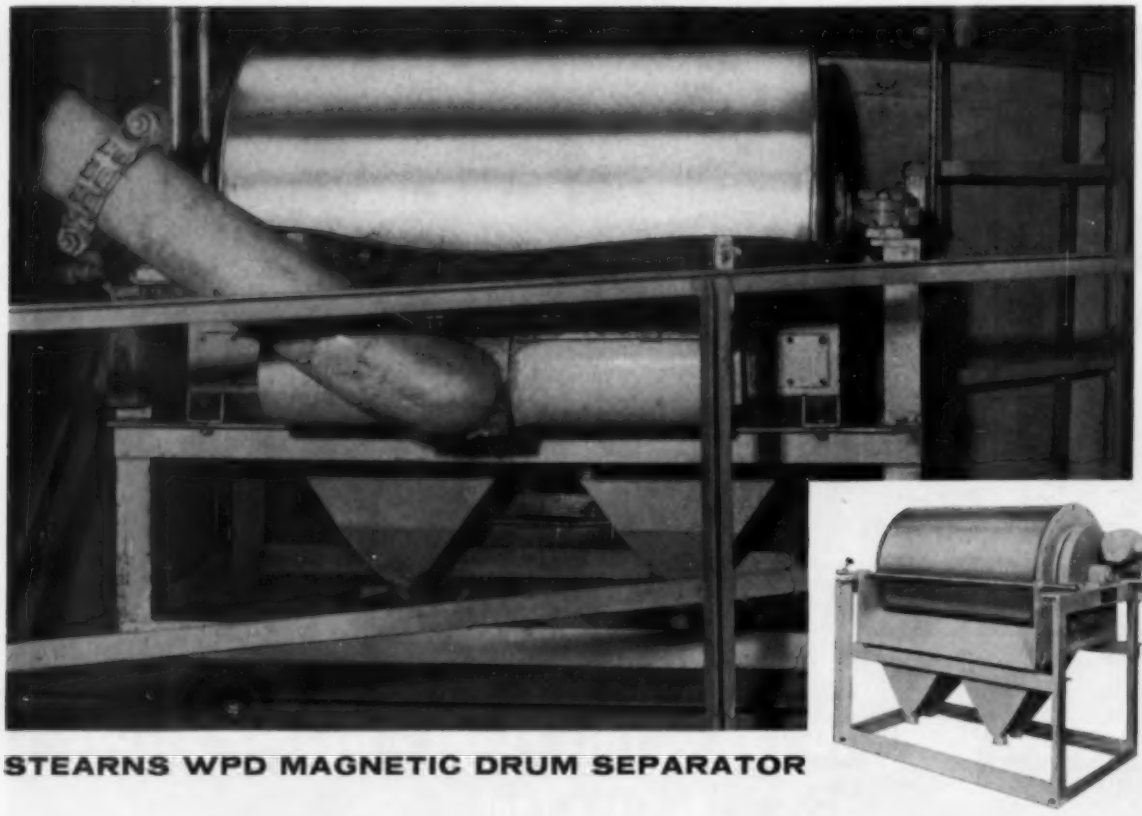

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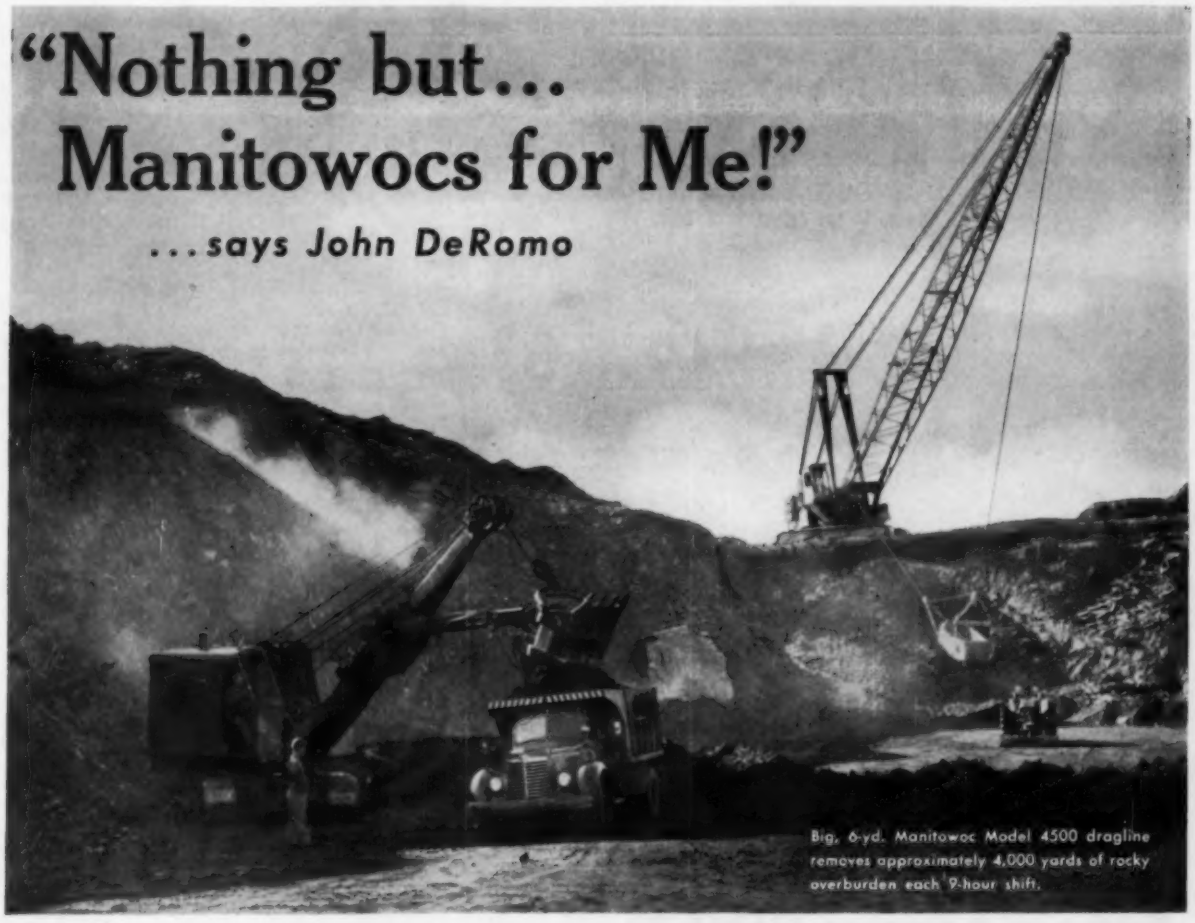

Big, 6-yd. Manitowoc Model 4500 dragline removes approximately 4,000 yards of rocky overburden each 9-hour shift.

The John A. DeRomo Coal Company relies on Manitowoc excavators exclusively to load out more coal per shift from its Houtzdale, Pa. mine. "Nothing but Manitowocs for me!" is how owner John DeRomo puts it — after using only Manitowocs for 10 years.

Three Manitowoc Units

The big capacity champ in DeRomo's lineup of Manitowoc machines is a 6-yd. Model 4500 dragline with 120′ of boom used for the heaviest stripping. Secondary stripping jobs are handled by a long-reach, 2½-yd. Model 3500 drag with 80′ of boom. A husky 1¼-yd. Manitowoc 2000 shovel has the loading assignment.

Re-Worked Mine Pays Off

The cut pictured is 110′ wide and has a 55′ face with a 28″ C seam of grade A bituminous coal. This seam produces an average 6,000 to 8,000 tons a month. Overburden is extremely rocky and hard-to-handle, but the 4500 dragline is removing about 4,000 yards per 9-hour shift.

John DeRomo is one of several operators to work over this area. Manitowoc capacity and efficiency help to make stripping of the heavy, rocky overburden a profitable operation. "We won't leave enough coal to keep a barbershop warm!" says DeRomo.

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The ability of a machine to get around fast means a lot to the overall profit picture on an operation of this type. DeRomo likes the mobility of his Manitowocs, pointing out that even the big 4500 dragline has traveled under low overhead obstacles without difficulty. And travel speed is fast and steady — even when climbing steep inclines.

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All of the DeRomo Manitowoc units have smooth-acting air controls. Operators stay at peak efficiency the entire shift — yet never lose the "feel" of manual control. Speaking of the smooth operation of his units, DeRomo says, "No strong arm is needed for my equipment . . . the 4500 drag rides like a baby carriage."

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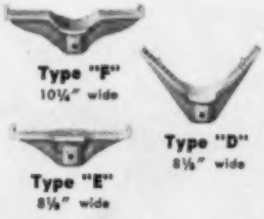

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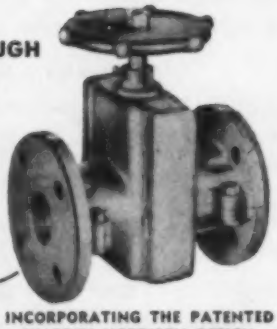

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ALPHABETICAL INDEX TO ADVERTISERS

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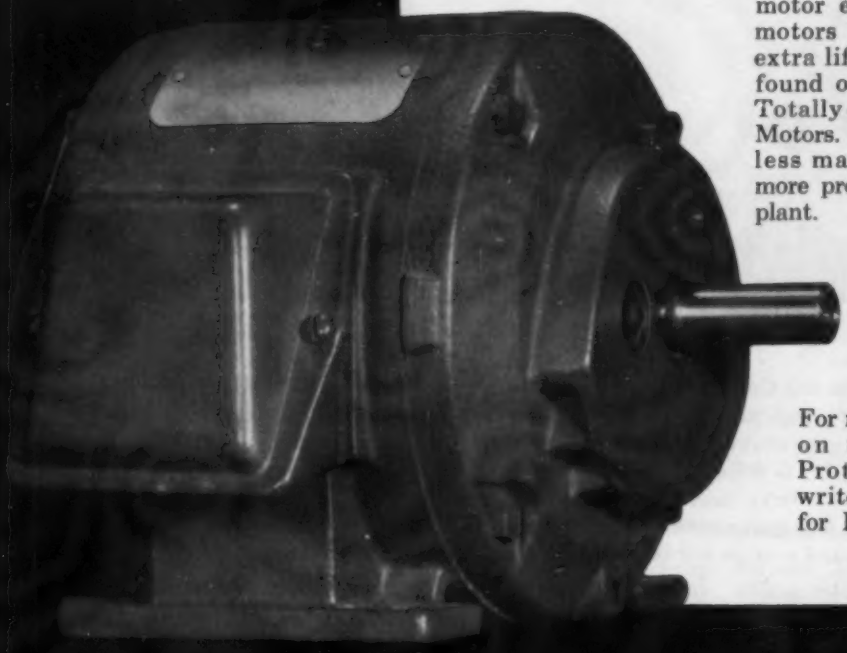
the world's only

TOTALLY-PROTECTED MOTOR

When we speak of Totally-Protected, we mean superior frame design with rigidity for heavy load conditions. We mean Metermatic bearing lubrication, acid and oil-proof insulation system, and motor leads, labeled and sealed in neoprene.

Totally-Protected means all this and more, but most of all it means a new concept of motor design and construction.

This Totally-Protected concept brings you a new motor efficiency. These motors have a built-in extra life—an extra life found only in Reliance Totally-Protected A-c. Motors. You profit from less maintenance and more production in your plant.



For more information on this Totally-Protected concept, write to Dept. 64A for Bulletin B-2401.

(B-1540)

RELIANCE R ELECTRIC

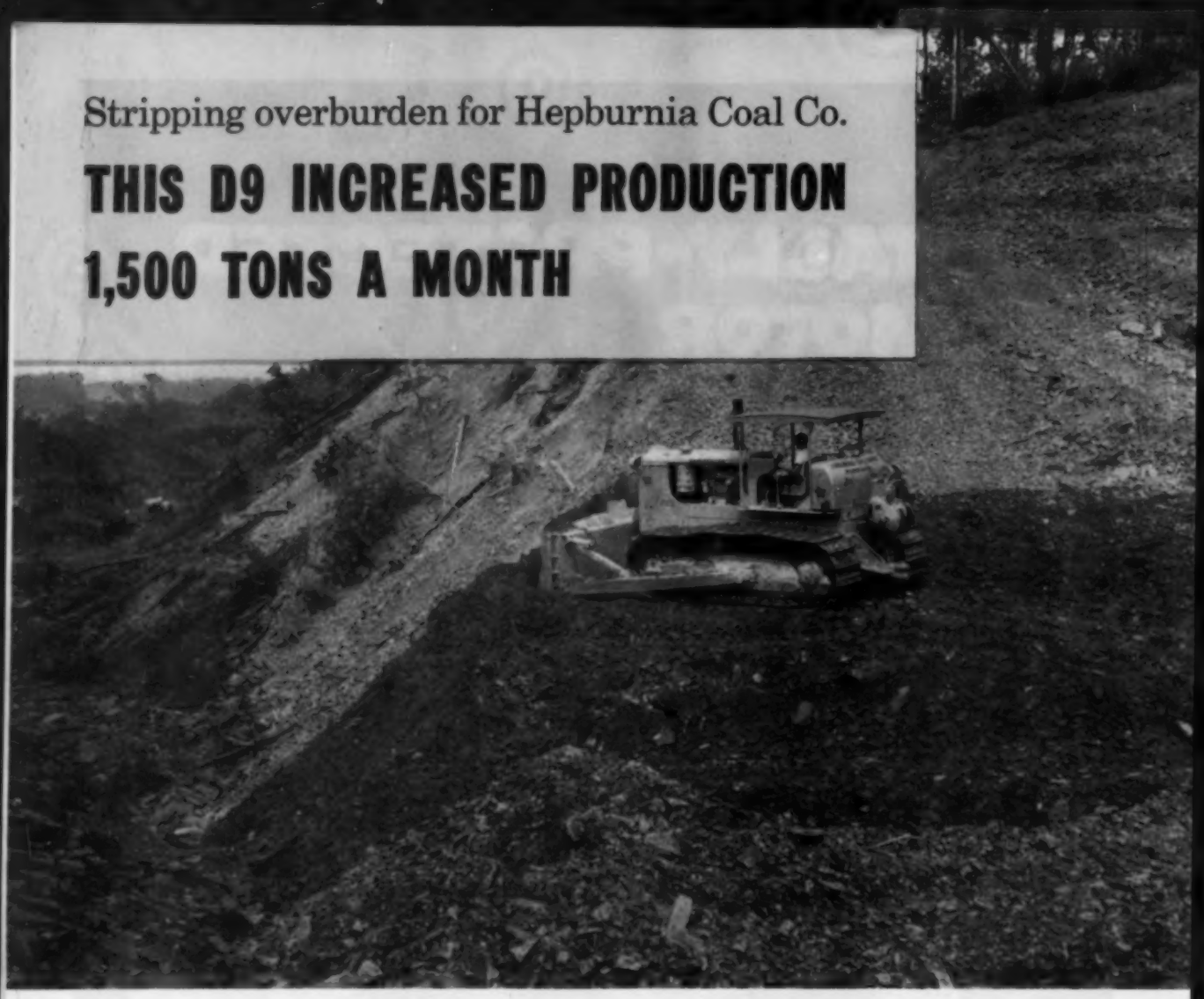
AND ENGINEERING COMPANY

CLEVELAND 17, OHIO · CANADIAN DIVISION: WELLAND, ONT.

Sales Offices and Distributors in Principal Cities

Stripping overburden for Hepburnia Coal Co.

THIS D9 INCREASED PRODUCTION 1,500 TONS A MONTH



The Hepburnia Coal Co. bought this CAT* D9 Tractor with No. 9S Bulldozer expecting high production from it. What was the result? Here's the answer direct from owner Don M. Spencer: "The D9 is doing more than we expected when we bought it. We've increased production by 1,500 tons a month. Our going is rough, too. We are in the second cut now and even so our production is up."

Stripping 40 feet of overburden from a 30-inch coal seam west of Grampian, Pa., the Turbocharged D9 benches and clears for a Hi-Lift shovel equipped with a Caterpillar Diesel Engine. It's on the job 8 hours a day, 6 days a week, delivering high production even in rough going.

Want to step up your production? You can't beat a D9 for pace-setting performance. Everything about this giant is engineered to handle big jobs profitably. It has power aplenty—260 HP at the drawbar and 320 HP at the flywheel. It has heft—35 tons of operating weight with bulldozer. It's maneuverable—hydraulic boosters provide easy steering, braking and clutching. And it's rugged. From tough track shoes to tough 4-cycle Caterpillar Engine, it's built to stay on the job day after day after day with a minimum of down time. What's more, it's easy to service. Oil clutch, torque converter, transmission and steering clutches each can be removed individually.

To match your needs, the D9 is available with torque converter or direct drive with oil clutch. For complete information, see your Caterpillar Dealer. He'll be glad to show you facts and figures of the D9's performance on mining operations. Name the date—he'll demonstrate!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WANTED—
THE HARD WORK

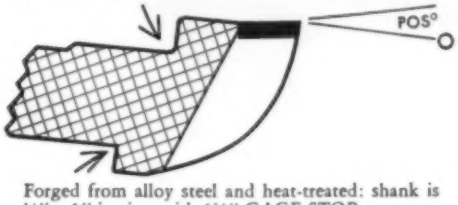
NEW CARMET "G" SERIES

CARBIDE BITS for CONTINUOUS MINING MACHINES

"THE BEST YET!"

JUST A FEW OF THE G-BIT'S ADVANTAGES

Forged-in hook angle prevents slip, in order to provide for fast bit removal. NO STUCK TOOLS.



Forged from alloy steel and heat-treated: shank is ½" x 1" in size, with 1¾" GAGE STOP.

The strongest cutting tip designed: Tip rake angles furnished to suit any cutting conditions. Strong tip support allows use of a harder, more wear-resistant grade of carbide for longer tool bit life, more regrinds, less down time. Strong braze material provides protection against tip loss.

CARMET DISTRIBUTORS

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Bruce-Mueller-Huntley, Inc.
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St. Clairsville, Ohio
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Persinger's Inc., Charleston, W. Va.
Union Supply Co., Denver, Colorado
U. S. Steel Supply Co., Pittsburgh, Pa.
W. B. Thompson Co., Iron Mountain, Michigan

★ ★ ★

Write for your copy of
"CARMET MINING TOOLS"
ADDRESS DEPT. CA-88

Here's what a major mining company in Pennsylvania says: "Carmet has proved to us that all carbide bits are not the same. We have reduced our bit costs by at least 25%. *Carmet is saving us money every day!*"

Carmet's years of experience in developing bit and shank materials, designs and fabricating techniques will pay off for you, too. In addition to the new "G" Series for continuous mining machines, Carmet distributors can offer you the widest line of carbide cutter and drill bits in the industry.

● Let them show you the Carmet way to lower tool cost and increased production. *Allegheny Ludlum Steel Corporation, Carmet Division, 1500 Jarvis Avenue, Detroit 20, Michigan.*

The Original DOUBLE-BONDED Carbide Bit

CARMET® AL

WSW 6574

350 TPH OF RUN-OF-MINE COAL is handled and processed at the recently completed Joanne Coal Company's plant at Rachel, W. Va. Facility reduces 24" maximum lumps to 5" x 0" uniform, 3.0% moisture content metallurgical and steam coal. Under a "turn-key" contract, Link-Belt supplied preparation plant, concrete blending bin, washery refuse bins, belt conveyors, coal thickener and refuse thickener.

How LINK-BELT designed, equipped and erected Joanne Plant under an

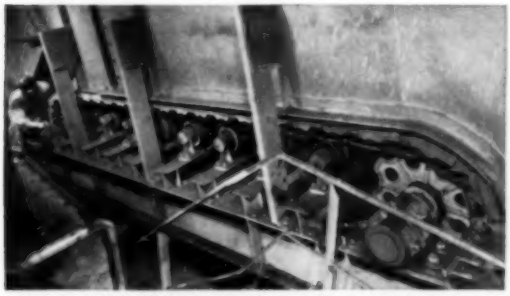
ALL-IN-ONE CONTRACT

AIR-PULSATED WASHER provides a clean coal free from refuse, bone, etc.—removes heavy refuse immediately . . . provides sharp separation of lighter refuse.

"Turn-key" service provides full facilities for producing metallurgical and steam coal

FROM foundation to finished 350-tph coal preparation facility—the Joanne plant is another example of Link-Belt single-contract service. Under this all-inclusive program, Link-Belt furnished materials handling and preparation equipment . . . followed through with erection and placed the plant in operation.

Call on Link-Belt to equip and build your new plant, or modernize your existing system. Our coal preparation experts will analyze your needs—recommend low-cost handling and processing best suited to your particular seam and market requirements. For complete engineering information and prompt service — without obligation — call your nearby Link-Belt office.



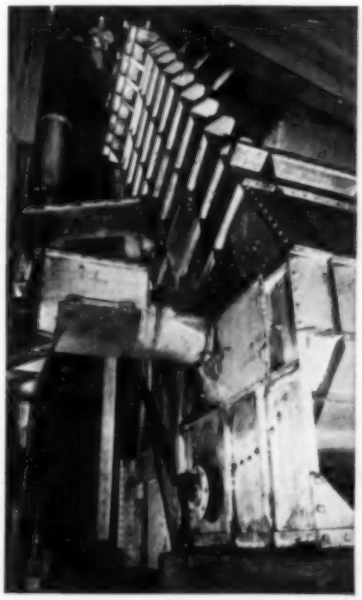
HEAVY-DUTY MANGANESE STEEL APRON FEEDER — 36 in. wide—delivers 350 tph of run-of-mine coal from dump hopper to vibrating screen.

LINK-BELT

14,303

COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Scarboro (Toronto 13), Springs (South Africa).



LINK-BELT MULTI-LOUVRE DRYER (one of two) provides thermal drying for ¼" x 0" centrifugally dried coal.

42-IN. FLIGHT CONVEYOR carries 5" x 0" raw coal to Link-Belt parallel bed air-pulsated washer on floor above.